THE MARINE REVIEW

VOL. 49 CLEVELAND APRIL, 1919 NEW YORK No. 4

Put U. S. Shipping on Its Own Feet

Specter of Government Operation is Proving Check to Entrance of Private Capital into the Field

TO BUILD up an American merchant marine money must be raised by means of government bond issues or by popular subscriptions to private stocks. The experience of the past months has demonstrated that private capital is not going to attempt to compete with government investment in shipping. For instance the American-Hawaiian or any other solid conservative line is not going to attempt to operate ships in competition with those belonging to the government. The government may acquire the habit of writing off the capital cost of ships, whereas a private company cannot do any such thing. Should the private American lines be guaranteed that the government ships were to be let out on charter, that the shipping board was not going to be permitted to set up an operating board, this fear of government competition would disappear and confidence return.

Why Ships Are Not Being Bought

But today the shipping board owns approximately 90 per cent of the American merchant marine while the private operators own the remainder. It would be impossible for the 10 per cent to attempt to compete with the 90 per cent if the capital investment on the 90 per cent is arbitrarily written off by the shipping board for its own operating purposes and whenever it is thought export freight rates should be lowered. It is because of the fear that the government is going into the operating game as well as the shipbuilding game that private lines refuse to purchase any of the ships which the shipping board is offering for sale. The cost of new tonnage has very little to do with this situation at present.

Recently at an important conference of ship operators the question was asked whether anyone would feel inclined to invest in new tonnage at a cost of $100 per ton. The reply was unanimous in the negative. And this price is less than tonnage can be purchased in England. The price has nothing to do with the problem just at present. The most disturbing element in recent days was Chairman Hurley's assertion that the shipping board would write off one billion dollars of the cost of the new merchant marine in order to run the government's vessels on lower freight rates. Private operators are perfectly willing to operate the government boats for a fair return; they are perfectly willing to accept competition upon a capital investment basis that is stable, but if the shipping board is to be permitted to set up an operating organization and hold it as a big stick over the private American lines, then the government would conspire to the setting up of an octopus that would drive all private individuals out of the business.

The wiser heads in charge of shipbuilding are beginning to realize that the experiment with government control was based upon the wrong principle. They are willing to set it all down to the exigencies of war and count it money spent to save the nation during a great emergency. You do not have to look far to find a shipbuilder who is anxious to get rid of the contracts that have been let to him by the Emergency Fleet corporation, so that he can get ready to get back into the healthy game of building upon a competitive basis and for private account.

Private Control Insures Future Success

Operators of ships are confident that there is a great future in shipping for the next ten years. If all the yards continue to build at their comfortable maximum they will not restore the supply of ships to normal in less than four years. If the government withdraws from the industry private capital will go into it willingly, but of course private capital will not go into it with anything like the force that the government has in the past, because to interest private capital public confidence must be restored in the business of shipping overseas. The return to private initiative would be an evolution which would grow in momentum. This is the turning point of the ways. It remains for the public to say whether they prefer to have government ownership with a continuation of the waste and extravagance which has amounted almost to a public disgrace during the past two years.

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World Charter Market Reviewed by

EXPORTS GROW

Withdrawal of Convoy System Permits Vessels to Travel at Maximum Speed Relieving Tonnage Shortage

ONE of the surprising announcements of the past month was that the total exports during January exceeded our exports for any previous month. The volume of foreign trade from our ports during February has set another record, although trade experts in a position to make an accurate forecast expect a falling off after this. The question of how this was possible when the ship shortage was alleged to have been so acute, is answered by the fact that during the past few months, the convoy system was abandoned. Ships were allowed to reach their maximum speed and were not required to delay their sailings merely to wait for a proper convoy. Toward the close of February, seven more American vessels were returned to their owners. This great shift from a war to a peace basis has been going on at a much more rapid rate than many steamship people themselves thought possible.

The New England coal trade has practically ceased and these ships are being chartered wherever they can be used. On March 1 the railroad administration released the remainder of the coastwise fleet. The Clyde line, which has reconsidered its decision to discontinue the service between New York and Philadelphia, is making trips Tuesday and Friday of each week. The company is operating under the same rates between New York and Philadelphia as are in force by the railroads, excepting that it does not pick up or make deliveries of lighterage lots of freight at New York when moving in lots less than 50 tons to or from one point in the harbor.

Three of the American-Hawaiian liners are to be returned and chartered to the United States Steel Products Co. in the South American trade. After the armistice until the end of 1918 there were no American ships offered for charter, but today charters are possible at approximately $8.33, government form. This is considered a high charter rate but compares favorably with the high point, $13, in July, 1917.

Many New Lines Established

Hardly a day passes but that some old line is re-established or a new one inaugurated. Now it is understood that the Cunard line intends to supplant the German lines which before the war ran great passenger and freight vessels between the United States and the channel ports of France. The entrance of the British company into this new field will not mean the relinquishment or weakening in any way of the other routes, which are being served at the present time, for it is the intention of the company to build vessels to supplement the mammoth AQUITANIA and MAURETANIA. These new vessels will be used between Liverpool and New York. The CANOPIC of the White Star line has sailed from New York to Azores, Gibraltar and Genoa, thus re-establishing the Mediterranean service. The Baltimore office of the Cunard, Anchor and Anchor-Donaldson lines has been established and opened for business under the management of Douglas G. Hanson, who has succeeded Arthur B. Swezey. Mr. Swezey will assume charge of the San Francisco office of the same company. The Red Star line resumed sailings from Philadelphia to Antwerp with the new steamer ROGIER, 5552 tons. The ROGIER came to Philadelphia from the other side in ballast. It is planned to maintain a fortnightly service with three boats, as before the war.

The Far Eastern trade out of New York has improved greatly. The tonnage offered is adequate for package and space freight but is not entirely adequate for bulk and heavy freight. The amount of tonnage for South America is quite satisfactory, although the exporters are demanding more. Prior to the beginning of the war there was about 25,000 tons deadweight plying between New York and South America monthly. The shipping board has allocated a total of 268 vessels, aggregating 1,193,921 deadweight tons, to the South American service in addition to the vessels privately owned. Over 750,000 tons are in the West Indies trade and nearly 9000 tons in the Central American trade. Many shipping board vessels are in the Mexican tank service.

Expect to Clean Up Freights

Since the signing of the armistice the ship lines have been busy cleaning up the great accumulation of freight which was present at nearly every American port. That work has kept them extremely busy. But some change is expected in the future. The orders from abroad are coming in only slowly and it is feared that there will be a scarcity of cargoes before the year is out. A revision of commodity prices in the United States may save this situation and shipping people are confident that this change will come. They are still certain that the next 10 years will be a bumper period for ship lines provided the government gives them an opportunity to do business upon a normal rather than an abnormal basis. The German merchant tonnage will be turned over to the allies before long and the American government will obtain probably over 300,000 tons, which can be used in the transport service. According

Crowds Out Germans

WITH the leaving of the steamship MAURETANIA on March 12 from New York, the Cunard line inaugurated its new service between New York and Southampton. The big passenger steamers have heretofore made Liverpool their home port, and the change to Southampton is expected to check any ambition of the old German lines to re-establish their services between America and the English channel ports. Hereafter the fast express steamships of the Cunard line, such as the AQUITANIA and MAURETANIA, will run to Southampton, with a stop at Cherbourg The New York to Liverpool service of the Cunard line will be maintained with vessels of large cargo and passenger capacity.

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Experts in This Country and Abroad

to word received from abroad, the Germans have offered the use of Bremen and Hamburg as ports of debarkation for the American troops. This, it is believed, would facilitate the return of soldiers.

The wooden ships built by the Emergency Fleet corporation, of course, are still available, but there is not much demand for this type of craft. The shipping board, however, intends to impress several of these vessels in the overseas service. During the month an interesting advertisement appeared in American newspapers over the signature of the secretary of the United States shipping board, asking for bids on some of these wooden ships. Bids were to be submitted not later than March 1. The longer the sale of these ships is postponed, the more difficulty will probably be met in selling them.

Although there is sufficient evidence that ship tonnage is today much easier than a month ago, the shipping board apparently is trying to make it appear that the demand is tremendous. Chairman Hurley is reported to have made a demand on the navy department to return immediately 500,000 tons of ships so that our export trade may be facilitated. Naturally the owners would desire to have their ships returned at the earliest moment because the sooner they get them back the sooner they can be put into trade and earn a little profit.

To Meet New Demands

Foreign lines are speeding up their shipping that they may earn freights before the rates are further reduced. During the past month the French line cut its rates from American ports to Bordeaux and Havre from $56 to $45 per ton on general merchandise. This being a government-controlled line, however, only about one-third of its cargo space is available for commercial purposes. At the same time this cut was announced the Fabre line was booking freight to Marseilles on the basis of $70 a ton and the agent reported no difficulty in obtaining cargoes. It would appear, therefore, that whereas shipping on many routes has eased up considerably, there is still an enormous demand for cargo space on others. Ships which can fit into the trades which are crowded are lucky. The readjustment to a peace basis is bringing out demands for new vessels. Much interest has been taken in the new type of boat which the Cunard line is to put into service. "The outstanding feature of the new boats," said Sir T. Ashley Sparks, head of the company, "will be a combination passenger and cargo-carrying capacity. It is difficult to say more than this just now. Probably the new boats will be oil burners. Not only that but there is a possibility of our converting our other vessels into oil burners."

World Ship Output

SHIP production throughout the entire world in 1918 aggregated 5,447,444 gross tons, a figure never before approached. The total is 63 per cent higher than the output of 1913, record prewar year.

The records compiled by Lloyd's Register show the production in the United States was 3,033,030 gross tons, a total greater than the entire output of the United States during the 10 years, 1907-1916, three times greater than the 1917 record and 25 per cent above the combined output of the rest of the world in 1918. Production in the United Kingdom was 1,348,120 tons; in Japan, 489,924 gross tons; in Canada, 258,191 tons.

MORE TONNAGE

American Government to Obtain Many German Vessels Which Can be Used to Transport Troops

Lloyds reported that the mercantile shipbuilding throughout the world in 1918 showed that the total merchant output of the allied and neutral countries for that year was 5,447,444 gross tons. This figure has never previously been approached. It is more than 62 per cent higher than the output for 1913, the record year prior to the war, which included the construction of the central powers. The British lines generally are making rapid progress. Plans have been drawn for the building of approximately 100 liners in England.

These plans of the British are most interesting in view of the announced plans of the United States shipping board to alter the types of merchant ships which are being built for the Emergency Fleet corporation. The peace time program of the board was worked out by a committee of experts drafted for this particular purpose. Larger vessels, it is believed by American experts, can be operated with more success because the operation of such vessels becomes largely a matter of executive ability, whereas with small ships the strictest economy of wages, etc., must be secured to compete with the British and other foreign operators.

Must Lower Operating Costs

Chairman Hurley had not returned to the United States but a few hours before it was clear that he had altered some of his opinions in regard to the shipping question. He is believed at last to realize that the problem of wages is a most important one and that our hope of competing with foreign vessels is not so easily realized as he thought when he set out for Europe. After giving one or two interviews, however, he set about to attempt to correct some of the high costs of operation. The first was to engage in a verbal battle with the marine insurance companies, giving the impression that marine rates are too high. As a matter of fact, the marine risk on the wooden ships is great and the charges for insurance on this class of vessels must of necessity be sufficient to meet that risk. With the great influx of marine insurance business, coincident with the abandonment of the government war risk insurance bureau, the private insurance companies have been swamped with business. The many recent losses at sea was

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the incentive needed to run rates up. The insurance companies, however, have shown a conciliatory attitude and are perfectly willing to work out the stabilization of insurance rates if the shipping board can prove that the present rates are excessive.

Aroused Over Wage Question

Ship operators are much more concerned over the wage question. If the shipping board would consent to give as much attention to that as it has to the insurance question they believe considerable good might be accomplished. Also a further revision of the operating agreement was sought, a request which was answered fairly favorably. An increase of ½ per cent in brokerage fee was allowed. But with the reduction in freight rates the companies accepting shipping board vessels for operation under agreement find that their profit on the deal is curtailed. They therefore are inclined to demand a high per cent on the freight receipts to compensate themselves for managing the government's merchant ships.

While the discussion over the improvement of the docking and freight-handling facilities at New York and Philadelphia proceeds, improvements to European ports are progressing rapidly. The work of repairing the devastation at the Belgian ports is well under way under the supervision of the administration of roads and bridges. In Ostend the clearing operations are carried out with the help of the British military authorities. In Zeebrugge, the British propose also to raise the numerous wrecks which have foundered in the port. The port of Bruges presents an extraordinary sight. Torpedo boats, submarines and floating docks have been sunk in the port where the Germans had constructed a formidable system of defense. In Antwerp the position is much more favorable, and the harbor plants are nearly all intact. All along the canals and rivers of Flanders there is a state of chaos, everything having been systematically destroyed. Toward Ghent, on the Scheldt, the bridges, locks and dams have been demolished; the flow of the water is therefore impeded, and there is danger of floods. Everywhere ships have been sunk, not less than 30 having been raised between Ghent and Termonde.

It is reported that the Canadian Pacific ocean steamship lines are considering seriously the advisability of making Portland, Me., their American terminus. This does not mean that St. John will be eliminated as a terminus, but the Portland terminus would be tied up with rail connections over the Maine Central railroad.

Situation is Chaotic on Pacific

Charter market conditions at north Pacific ports are in a state of readjustment and until several points of uncertainty and difference are cleared it will be impossible to gage the level of the market. The situation is most chaotic, owners, agents and shippers having divergent ideas. While the United States shipping board has announced a basic rate of $12 from north Pacific ports to the Orient, this is purely a paper rate. Owing to the shipyard strikes, several vessels approaching completion for the United States government have been seriously delayed and the federal authorities have been unable to place any ships on the berth so as to enforce the $12 rate. As far as known no steps have been taken to compel private operators to accept this rate. In the meantime, most of the freight moving is going at rates ranging from $30 to $45, much of it having been booked months ago when the market was firm and space scarce.

There is no question that Oriental freights are weak. It is reported that several lines on this route have an understanding to place rates on a basis of $15 per ton plus whatever extra is warranted by conditions, this to apply after April 1. There is considerable doubt whether the market will reach this low level by that date although some readjustment will probably have been effected within the next month.

Orient Cargoes Are Light

There is a scarcity of cargo coming from the Orient. Several vessels have arrived recently from China and Japan with only part cargoes, a condition unknown for more than two years. One large carrier came from Japan in ballast a few weeks ago. In addition, several large Japanese freighters, which have been under charter to the United States government for the last 10 months, have recently been released and are coming from the Atlantic to the Pacific in ballast. This condition is affording an abundance of space for the Orient and is certain to clear up the vast congestion of freight at Pacific coast terminals within a short time.

Pacific coast shippers and shipowners are awaiting with anxiety the establishment of through rates by the railroads. At present lower freights are offering to the Orient from New York by the all-water route than from the Pacific coast. It is understood that the railroads are giving consideration to combined rail and water rates but until this matter is adjusted, the Pacific coast is at a disadvantage.

The decision by the railroads not to absorb handling charges at Pacific coast ports, as in the past, has resulted in a deadlock between the water and land carriers. The railroads have compromised to the extent of announcing their willingness to absorb part of the charges but the steamship operators have flatly refused to pay any of this cost, insisting on the practice, which has been in existence for years, of receiving and delivering cargo at ship's sling. This controversy has added to the uncertainty of the general situation here.

If the shipping board places sufficient tonnage on the berth, it is agreed that a $12 rate to the Orient can be enforced, but until it is done by sufficient ships to compel private carriers to meet the cut, freights will continue to be based on a matter of supply and demand.

Lumber freights in the Pacific are considerably weaker. Whereas, $60 was recently paid for lumber to Buenos Aires, owners are willing to now accept $55 or less. Melbourne commanded a rate of $48.50 several months ago, but this has declined to less than $40. Other trades, in which lumber moves in quantities from north Pacific ports, have shown similar declines.

Under existing circumstances, it is difficult to do business. The absence of a fixed policy by the shipping board is exerting a deterrent influence on the entire situation. Owners and charterers both are loath to commit themselves and until the atmosphere clears, no person has any fixed basis upon which to work.

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U.S. Yards Can Meet All Competitors

Quantity Production Methods Certain to Keep American Shipbuilders in First Place in World Competition—Operating Success Assured

By J. H. Rosseter
Director of Operations, Emergency Fleet Corporation

SPEAKING from the experience of a lifetime, I want to go on record with the statement that we *can* build ships and that we *can* operate them successfully in competition with the world. That does not mean we can do so as we are now going. But the way and the means are open to us. We must clear our vision and start with determination for the goal. Of course we pay higher wages than our competitors, also we charge more for overhead. Both items must be corrected.

Good and loyal workmen, efficiently directed, and with that all-powerful agency of American ingenuity brought to the task, will soon win for us the lead in shipbuilding as in other industries. However, our shipyards must reduce overhead charges to the basis of quantity production. This is a warmly disputed point but I want to say most emphatically that the question of high wage loses much of its importance in face of an overhead charge equal, and, in many cases, in excess, of the total cost of labor or the total cost of material, or, in other words, an overhead equivalent to more than 50 per cent of labor and material combined.

Costs Must Come Down

It is simply preposterous and can be predicated only on the theory that the capital investment is to be cleared so that if necessary the plants can be abandoned after the government has finished its program of construction.

Now, as to labor. There are many abuses to be checked and corrected and the men themselves must help to bring this about if they hope to find steady employment in shipbuilding. Beyond dispute, there has been a shocking amount of so-called "soldiering" on the job. No doubt the cost plus system is responsible for a great deal of the inefficiency and poor work done during the war period.

We are face to face with a serious situation. Unless our shipyards and ship workers can make a per ton price comparable with our foreign competitors, how can the shipping board ask congress to extend or confirm authorizations that were made in a time of danger and as a war necessity? Now that the emergency has passed we must return to sound business principles and certainly the government cannot go on building at a cost higher than our competitors. I repeat, with firm conviction based on experience, that American shipyards, efficiently operated and with a reasonable charge for overhead can build in competition with the world. If they will agree to this we can urge on congress sound arguments for the extension of the necessary authority to be made effective by appropriation. Then we will have the ships we need to compete successfully in world's trades. If we are to compete successfully in world's trades the right-sort and the right-price ship must come first.

As to operations, we have heard much of high seamen's wages. It is true our wages are higher than foreigners. For my part I would not change the wage of our seamen, because good wages and living conditions will attract our young men to the sea. Without a seafaring class we can never be great or self-reliant in maritime business or affairs. Needless to say we must have good service for good wages. Also we must avoid the evil of overtime at sea, which has unhappily grown to be an abuse and a menace. A generous scale of wages, if it be stable and not disturbed by the uncertain and destructive element of overtime, does not figure as large as many people believe. You might be surprised to learn that it is barely more than 7 per cent of the total operating expenses under conditions prevailing at this time. And I want to make clear that 7 per cent does not express the difference between the American and foreign scale but the sum total of wages. Thus you see it is not threatening.

There are other and more serious elements of the problem. Of these the first cost, or investment, looms large. For instance a 10,000-ton steamer costs to build in America, as at present, $1,750,000 against a foreign cost we will generously say of $1,250,000 or a difference of $500,000. On this difference must be figured not only a fair rate of interest but also depreciation with 12 years or at the utmost 15 years as the reasonable expectation on value of the ship's life. Also insurance must be figured. Together these three items can be reasonably stated as amounting to 16 per cent on $500,000, an annual change of $80,000 or $6500 per month.

Against this the pay roll on such a ship totals $3981 monthly at the American scale of wages for a complement of 43 all told. Let me emphasize that interest, insurance and depreciation as above, is calculated on the difference in price of foreign and of American construction. Thus you can see how important it is to reduce our constructive costs to the same or lower prices than foreigners.

Again, ships under the American flag are discriminated against in rules of measurement and other stupid regulations, but these undoubtedly can and will be changed.

On the other side of the picture we have some advantages in the matter of operating expenses. The single item of oil fuel represents a saving in operation sufficient to offset the entire wage cost. However, to hold this advantage our ships must be assured of oil bunkers at reasonable prices and also be assured of facilities to replenish bunkers on all foreign trade routes. The difference in value of oil fuel for ships as compared with land installation, is beyond reasonable comparison and if there be any uncertainty about the supply of oil we should do whatever is necessary to conserve it for our ships.

War Changes General Impressions

The importance of having our own merchant marine has been little understood or appreciated. In prewar days there was a general impression throughout the country that shipping was of interest only to a small class of shipping men or people living on the beach. The last few years has served to change the general impression in that respect. The war brought a realization that we must have our own ships to carry our goods and to bring us the necessary raw materials, and now that war has passed we are still facing a quite serious situation because we have not sufficient tonnage for our national requirements. Every day, for weeks and months past, I have had insistent demands for ships and notwithstanding that we have new tonnage coming at the rate of 15,000 tons per day, I find myself utterly unable to take care of the situation. It is to be regretfully stated at this time we have applications for more than a million cargo tons which we have had to place on a deferred list while struggling with the most urgent or preferential lists.

The war department still requires a large number of our ships, at this moment more than 2,000,000 tons, for both

(*Concluded on page* 185)

Address delivered at meeting of American Manufacturers' Export association, New York, March 4.

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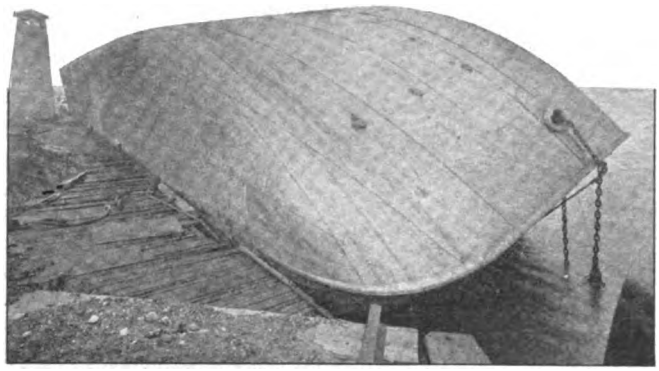
Successful Engineering Feat Opens Broad Field for Lake Yards



Bow Section of the Vessel Nearly on Her Beam Ends During the Rolling Operation

WHILE the majority of Great Lakes shipyards are adequately equipped to build vessels of the largest size, their usefulness in building salt-water tonnage is restricted by the limitations imposed by the size of the canal locks through which ocean-going vessels have to pass on their way to tidewater. Thus, Great Lakes yards, during the war, built vessels up to 4200 tons deadweight capacity, the maximum size which could pass through the locks intact. The war record of lake yards in speed of construction testifies to the important part they could play in building world tonnage if means were available for getting large ships to the Atlantic.

The government early attempted to increase the volume of lake tonnage adapted for war service on salt water. This was done by first enlisting the full strength of the lake shipbuilding capacity and second by cutting in two vessels too long to pass the locks but of suitable beam. A number of such vessels were taken to the Atlantic, the halves being rejoined on the lower St. Lawrence river. The restriction imposed by the locks on the breadth of these larger vessels again introduced a limiting factor, which prevented lake yards from sending out the largest size of vessels.

To overcome this barrier, a plan was worked out for cutting a vessel in two and taking the halves through the locks on their beam ends. This plan is said to have originated with several men at about the same time but the plans were matured by F. A. Eustis who obtained permission of the shipping board to prove the practicability of the idea.

An official report of the government, which is freely abstracted in this article, shows that exhaustive preliminary experiments were conducted. This was done with a tin model in a large galvanized iron tank. These experiments were encouraging and later larger wooden models of actual ships were made and tested. No data had been obtained, aside from rough approximations, of the weight and position of the center of gravity of these ships, so that the experiment did not bear any intimate relation between the performance of the model and what might be expected of the ship. It did, however, disclose the fact that under certain conditions the model could be rolled over gradually on its side.

It also proved that if the ballast used in turning the model were all placed upon the deck that the model would flop after it reached an angle of inclination of about 35 degrees. It did not turn all the way over but after several oscillations it would come to rest at approximately 65 degrees. This was a serious matter which called for the most careful investigation in order that no accident might occur when the big ship was turned.

It was first proposed to build a new ship, but this was subsequently revised by a suggestion made by the engineers' committee, that an existing bulk carrier of the approximate size of the proposed new ship be requisitioned and cut in two for the purpose. This recommendation proposed the commandeering of the CHARLES R. VAN HISE. On May 28, 1918, Mr. Eustis received authority from Mr. Piez to proceed with the work of requisitioning the VAN HISE. On June 28, 1918, work was begun on her at the yard of the Lake Shipbuilding Co., Buffalo.

Some Alterations Were Necessary

This ship was constructed upon the longitudinal system, with heavy belt frames every 24 feet and intermediate web frames every 12 feet. It was necessary to increase the depth from 29½ to 33½ feet as the ratio of depth to length, over 15 to 1, was excessive for ocean service. As the ship was to be used in the coal trade, the full depth of hold was not required for stowage purposes and it was decided to let the old belts and arch beams remain and simply raise the deck 4 feet. The old spar deck stringer was also retained, and a girder run on the inboard side between the old and new spar deck stringers, forming wing tanks, to be used for ballasting purposes. These wing tanks were quite important in turning the vessel upon her side before locking her through.

There was no time to make calculations before starting work, if the ship was to be completed before cold weather. The plans for the reconstruction were finished as fast as possible without regard to, or knowledge of, any special requirements for turning her over. A survey of the locks gave us the information that 44 feet

Careful Preliminary Tests Made

TO determine the feasibility of the plan of taking the steamer CHARLES R. VAN HISE *through the locks of the Welland and St. Lawrence canals on her beam ends, careful experiments were first made in a tank using tin and wooden models. From these experiments approximations were obtained regarding the weight and position of the center of gravity at several points during the subsequent rolling operation on the ship.*

These experiments disclosed the fact that under certain conditions the model could be rolled over gradually on its side. They also proved that if the ballast used in turning the ship was all placed on the deck it would flop after an inclination angle of 35 degrees was reached.

In these experiments, the model did not turn all the way over but after several oscillations it would come to rest at an approximate angle of 65 degrees. This was a serious factor which called for the most thorough investigation in order that no mishap might take place when the ship was turned.

The problem of handling such a large vessel in this manner was a novel one and the successful manner in which it was solved is indicated by the fact that actual turning operations were carried out without difficulty. The forward half was towed from Buffalo to Port Colborne and taken into the first lock on trial. Opening of navigation this spring will permit both halves to be taken to the lower St. Lawrence where they will be rejoined.

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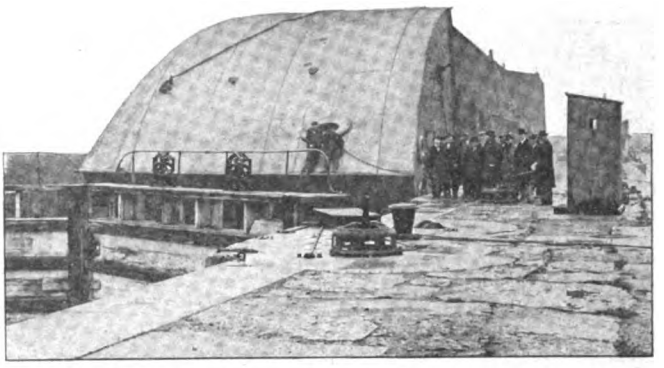
Large Lake Steamer Being Sent to Atlantic on Beam Ends



Bow Section of the Vessel on Her Beam Ends as She Appeared in the Canal Locks

5 inches was the width at the narrowest lock and it was decided to make the overall width of the ship on her side at the 14-foot water line an even 44 feet. A wooden fender was fitted to protect the thin plating of the pontoons and this was fitted vertical so as to be easily removed and thus provide additional clearance for an emergency. The pontoons were designed to occupy the available deck space, being omitted where the ship's superstructure would have reduced their depth or thickness to a point to make them of little value.

With the reconstruction well under way, calculations were made by Wilbur F. Powers, technical assistant of the shipping board, to determine the methods to be employed to insure the success of the undertaking. The weight and the center of gravity of each section was the most important point to be determined and as it was impossible to wait until the ship was cut in two, it had to be determined by experiment. Calculations had to be relied on solely. This was done by the laborious process of taking, item by item, in transverse sections, for each 4-foot frame space, for the entire length of the ship. Then when it was decided just where the cut was to be made, it was an easy matter to combine the weights belonging to each half.

After the weights and position of the center of gravity of each half of the ship had been determined, the weights of each pontoon and its center of gravity was calculated. Then the weights of water, with its center of gravity, which each compartment of the double bottom, wing tank, or pontoon would hold, was determined.

Next the displacement, center of buoyancy and metacenter of each half when on its side on an even keel drawing 14 feet of water was found. It was decided to obtain a metacentric height of at least 18 inches when the sections were on their sides. To do this, it was then seen that the center of gravity of the ship would have to be shifted about 6 feet athwartships and raised 4 or 5 feet. The difference between the light weights of each section and its displacement when drawing 14 feet on its side was approximately 1000 tons and this weight had to be applied in such a manner that it would turn the ship exactly 90 degrees and through varying degrees of trim on to an even keel, so to speak, when finally on her side. Having certain fixed compartments in the ship and pontoons available, the proposition was simply one of selecting those compartments which, when filled with water, would move the combined center of gravity of ship and ballast to as nearly as possible the desired final position.

How Final Adjustment Was Made

The final adjustment, of course, had to be secured by placing a certain definite amount of fixed ballast in such a position that it would balance all the other weights about a point over the final center of buoyancy. The boilers and engines and all machinery were left in place, in the after section, and in order to make the final adjustment in this section, 135 tons of steel punchings were placed next to the shell of the ship, between the frames.

It was decided to carry on board all materials which could not be incorporated into the structure previous to passing through the locks. This included deck houses, engine and boiler casings, anchors, anchor chain, bitts, chocks, boat davits, companion ladders, stern tube, bushings, propeller blades, stern frame, rudder, winches and windlass, masts and all plates removed at the cut. These articles, for the most part, were stowed in No. 1 hold of the forward section and were utilized as the fixed ballast for that section.

The final distribution of weights were as follows:

	Forward section	After section
Hull, tons	1674	1578
Machinery, tons	...	263
Pontoons steel, tons	103	146
Fixed ballast and equipment, tons.	151	196
Water in wing tanks, tons	130	115
Water in pontoons, tons	464	496
Water in inner bottom, tons	172	...
Total weight, tons	2694	2794
Total fixed weight, tons	254	342
Total water ballast, tons	766	611
Total added weight, tons	1020	953
Draft on side, feet	14	14

After the amount and distribution of the weights necessary to turn each section on to its side and make them stable when in that position was determined, it remained to investigate the stability of each section while being rolled. After considering various methods of cross curves, it was de-

How Great Lakes Yards May Profit

WHEN the forward end of the steamer CHARLES R. VAN HISE *on her beam ends successfully entered the first lock of the Welland canal, it proved conclusively that the restricted lockage accommodations of the canal were not a positive barrier to the transporting of large vessel sections to the sea coast. While ships have been cut in two and locked through in two sections, the trip of the forward section of the* VAN HISE *shows that it is possible to take a comparatively large vessel through the canal with the sections rolled on their beam ends.*

To rivet the vessel sections together without drydocking is another plan which will be tested and if successful will strengthen the ability of Great Lakes' builders to construct deep-water tonnage. When the vessel is on her beam ends, only a comparatively small section is under water. Thus, it will be an easy matter to float the sections together and rivet the joint for approximately two-thirds of its length. By righting the vessel and careening her until her bilge is out of water, the remainder of the joint can be readily riveted.

The VAN HISE *is a flush decked vessel which necessitated building entire pontoons to retain the water used as ballast in the rolling operation. By building well-decked vessels, as commonly used on deep water, the work can be materially lessened as with this design, two sides of a pontoon are already available for use.*

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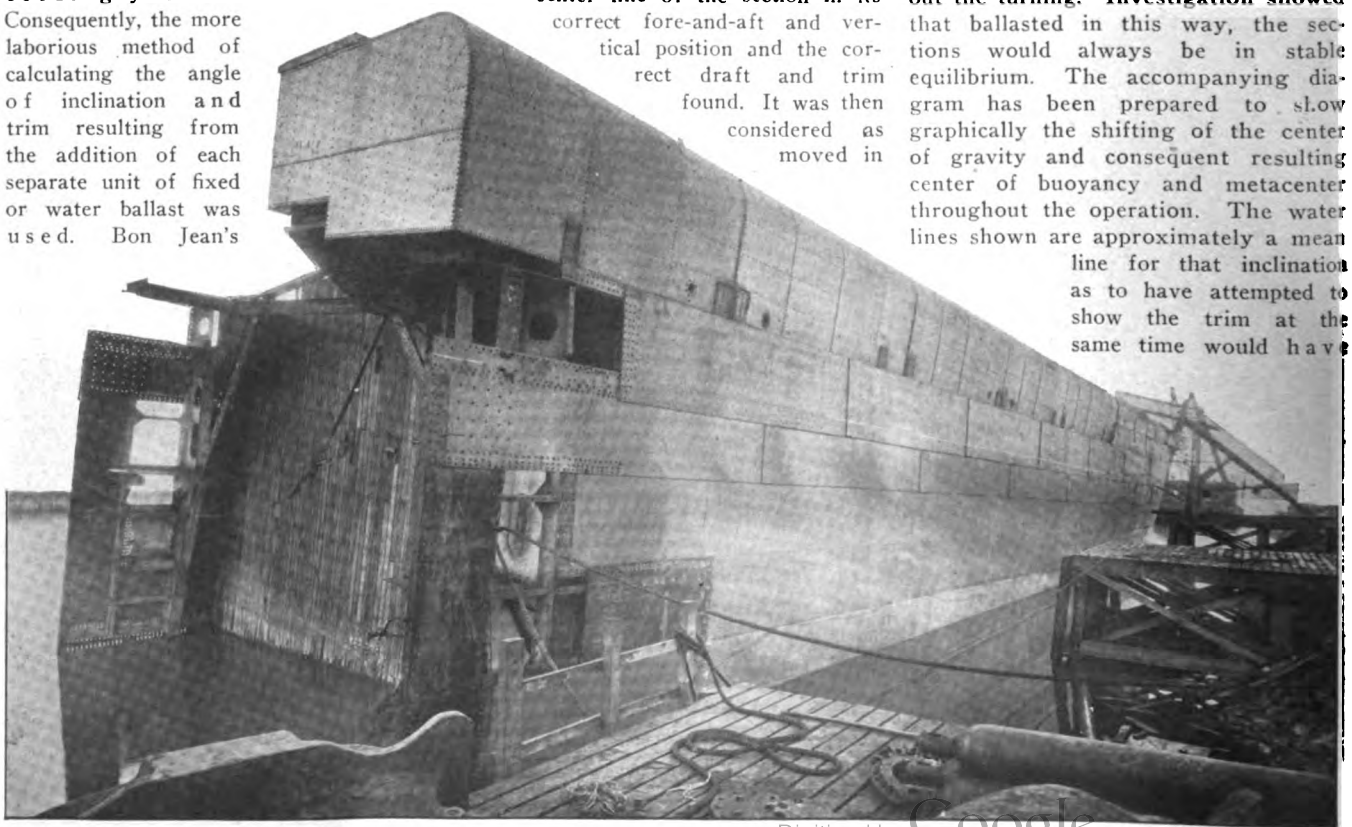
REAR OF THE FORWARD END NEARLY ON ITS BEAM ENDS—THIS ILLUSTRATION SHOWS THE BULKHEAD TO KEEP THE WATER OUT OF THE HOLD

cided that the changes in trim, due to the adding of the ballast, made the results obtained by such curves exceedingly doubtful. Consequently, the more laborious method of calculating the angle of inclination and trim resulting from the addition of each separate unit of fixed or water ballast was used. Bon Jean's curves were used to quickly get the desired displacement and trim. The weight was first considered as placed on the center line of the section in its correct fore-and-aft and vertical position and the correct draft and trim found. It was then considered as moved in a transverse direction to its final position. These figures were carefully checked several times as the calculations were made.

The turning moment of this weight, and the resisting moment of the ship for several angles, varying by 10 degrees, was then calculated and curves drawn, the intersection of which gave the angle of inclination caused by the added weight. This was fairly satisfactory, but the results had to be modified and rechecked each time owing to the fact that in rolling over to a new angle the section was constantly changing trim. However, this work was the means of forming a complete mental picture of what was taking place and enabled the engineers to judge closely the action of the sections, when they were finally turned. At about 40 degrees the curves of inclining moments and resisting moments failed to intersect, showing that a point of instability had been reached. This had been noted with the model.

How Displacement Was Increased

It was then decided to fill the forward port compartment of each section, and hold it full of water, until all the other tanks and pontoons were filled, and then pump this out. By doing this, the displacement was increased giving a much wider water plane, and consequent higher metacenter, and the center of gravity was lowered while at the same time the sections trimmed more evenly throughout the turning. Investigation showed that ballasted in this way, the sections would always be in stable equilibrium. The accompanying diagram has been prepared to show graphically the shifting of the center of gravity and consequent resulting center of buoyancy and metacenter throughout the operation. The water lines shown are approximately a mean line for that inclination as to have attempted to show the trim at the same time would have



HOW THE AFTER SECTION APPEARED WHEN READY TO ROLL OVER TO AN ANGLE OF 90 DEGREES

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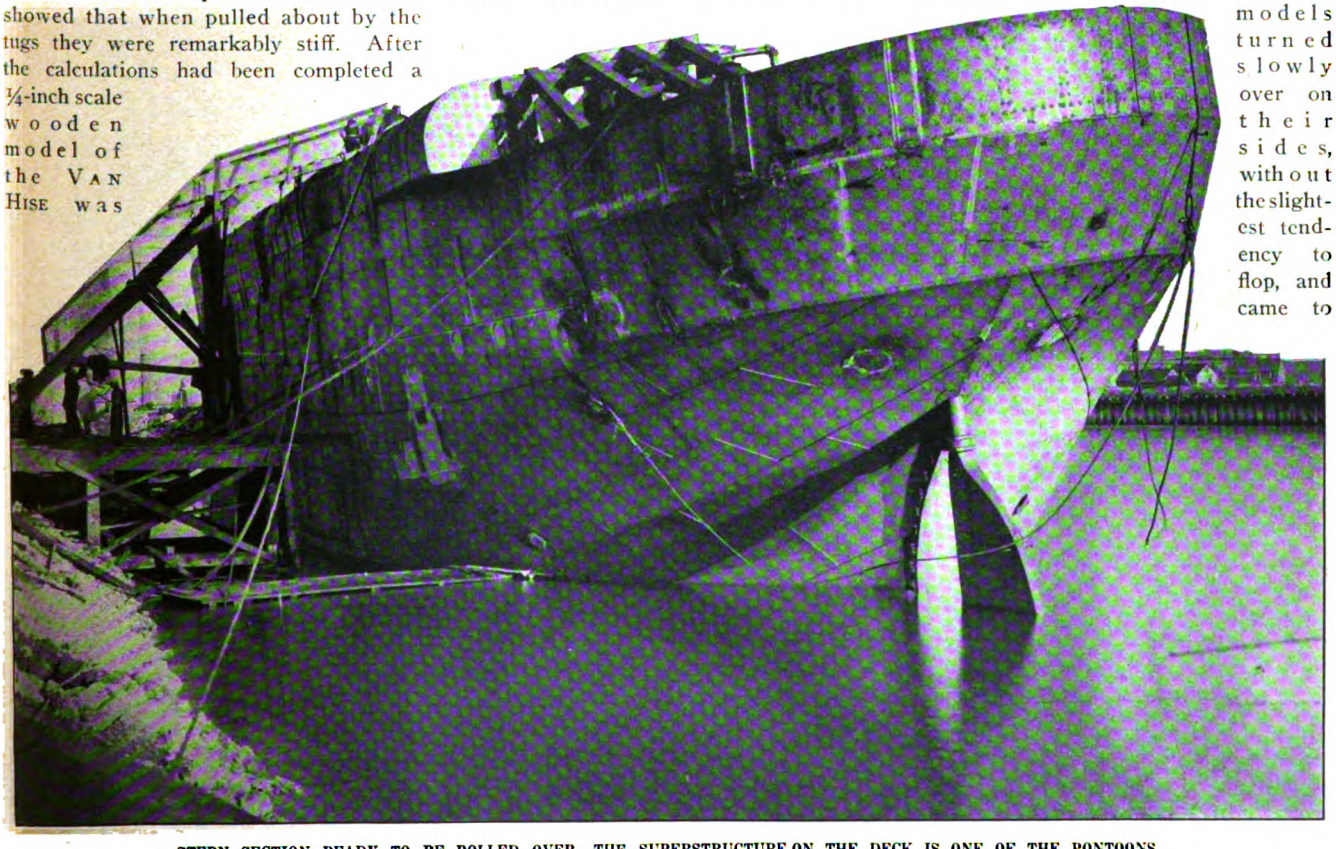
made it confused. The inclinations shown were checked when the ship was actually rolled.

It will be noted that the various points marking the path along which the center of gravity moved from zero to 6 in both the sections have been numbered. The right half of the diagram shows the forward section and the left half the after section. The position zero is the calculated position of the center of gravity before weights were added and number 1 the shift caused by placing all the pontoons on board in their final location. The point 2 is reached when all the fixed ballast or articles of equipment are stowed and point 3 shows clearly the extent to which the center of gravity has been lowered and moved outboard by filling the port inner bottom forward compartment in each section. From 3 to 4 the wing tanks have been filled and from 4 to 5 the pontoons on the deck filled. The shift from 5 to 6 is due to pumping out the water from the port inner bottom causing the ship to come slowly to an upright position.

The path of the center of buoyancy and metacenters are clearly shown. It is interesting to note the fall in the metacenter as the rectangular bilge is immersed and the water line narrowed, also its rise as the bilge of the pontoon enters the water, and its fall again as the ship comes upright. This diagram clearly shows that the sections are perfectly stable at all times, and the actual experience with them showed that when pulled about by the tugs they were remarkably stiff. After the calculations had been completed a ¼-inch scale wooden model of the VAN HISE was carefully weighted and balanced to agree with the calculated weights and centers of gravity. The tanks and pontoons were carefully measured to contain the proper amount of water. When these were slowly filled the models turned slowly over on their sides, without the slightest tendency to flop, and came to

BOW SECTION COMPLETELY ROLLED OVER AND READY TO ENTER THE LOCKS—ONE OF THE PONTOONS IS SHOWN IN PLACE AT THE WATERLINE



STERN SECTION READY TO BE ROLLED OVER—THE SUPERSTRUCTURE ON THE DECK IS ONE OF THE PONTOONS

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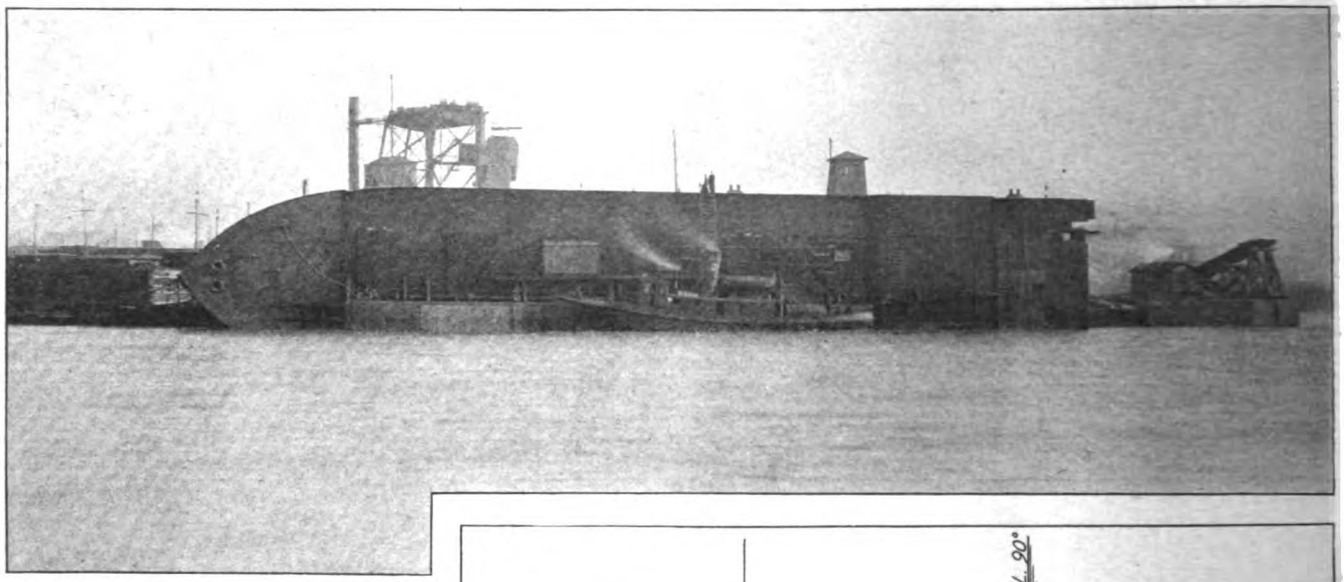
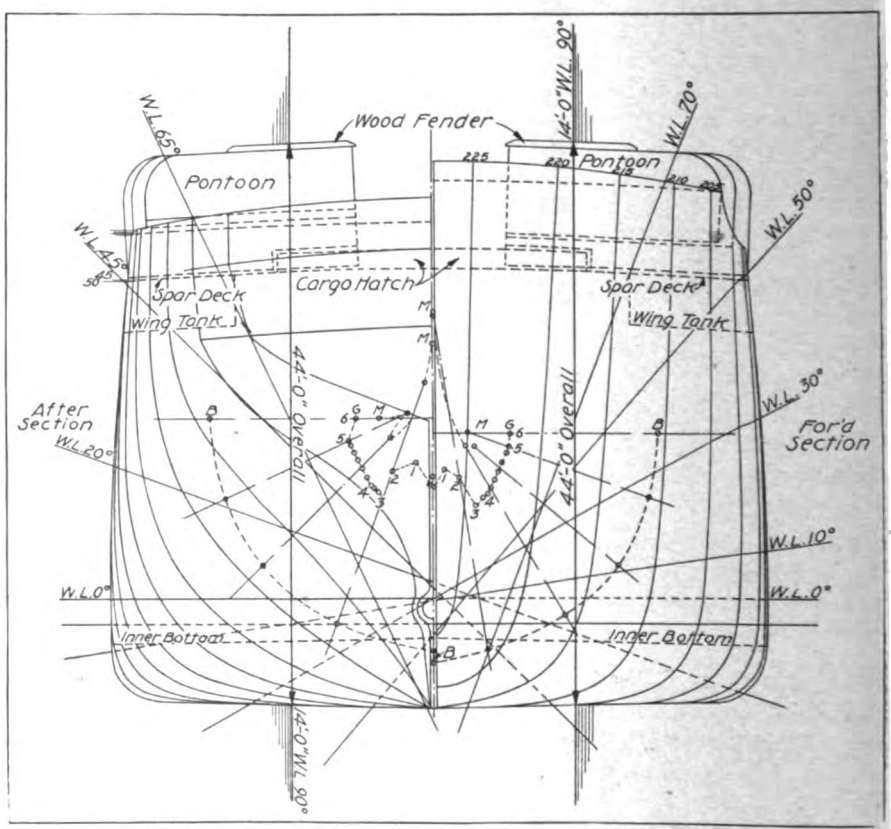
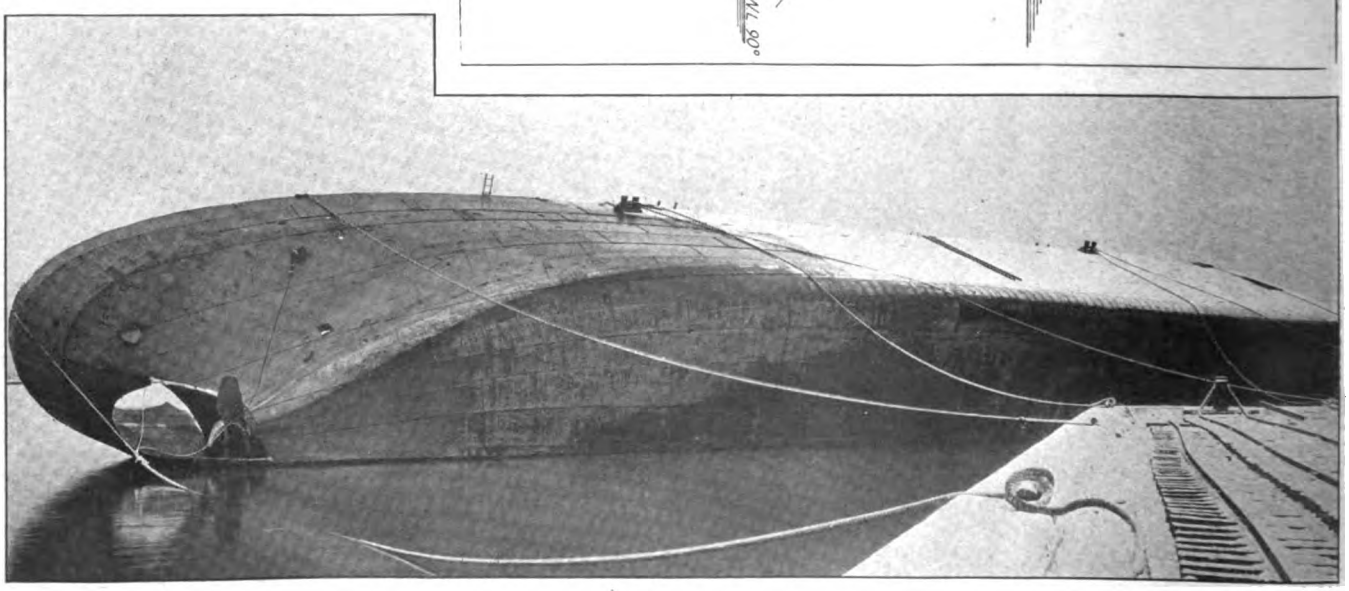


rest on an even keel at the designed draft of 14 feet. This gave a reasonable assurance that no serious errors had been made in the calculations and that unless considerable differences between the plans and the ship had been made that the actual turning of the ship could be safely undertaken. In the after section, the ship's ballast pumps were connected up so as to take water through the permanent sea cocks, and discharge it through a 12-inch main, to all the tanks and inner bottom compartments. An extra pump was placed upon deck, to handle the water through the same main. This pump was for use when the ship was on her side. The permanent ballast system was relied upon to pump out all of the double bottom compartments. All valves were arranged with extension stems, so as to bring their hand wheels upon deck. The object of this was to assure ready manipulation at all times.

(To be concluded.)





THE UPPER ILLUSTRATION SHOWS THE FORWARD END AT THE START OF THE TRIP THROUGH THE LOCKS—THE CENTER DIAGRAM SHOWS THE CALCULATIONS MADE—LOWER VIEW IS THE AFTER END ROLLED TO A POSITION WHERE IT IS NEARLY ON ITS BEAM ENDS

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Standardization of Marine Engines

Composite Design Embodying Approved Features of Standard Types is Advocated—Faults of Individual Engines to be Eliminated

ASSERTING that the word "standardization", when taken in connection with marine engines, had become greatly abused, W. V. Lang opened an interesting discussion on the standardization of marine engines for cargo vessels before the Institute of Marine Engineers of Great Britain at a recent session. He stated it is difficult to define standardization exactly in its present-day sense.

He pointed to the proceedings of the Northeast Coast Institution of Shipbuilders and Engineers, at the meeting held in Newcastle, England, recently, as marking a great advance in marine engine construction, in that the old-fashioned ideas of numerous designers were sought to be skillfully focussed upon one type and approved pattern. He said it is a hopeful sign that men at the head of world renowned companies, should drop their differences on minor points and try to agree on main principles.

Simplicity Should Characterize Design

In taking up the body of his discussion, he stated in part as follows: A composite design, embracing the best and eliminating the faults in individual engines, should be the object and the outcome of all deliberations. It is to be hoped, and fully expected, that simplicity with ample strength and rigidity will characterize an adopted design; and from the data available in the various existing designs there should be no lack—or need of revision—in thickness of cast iron sections or flanges, or of bearing and wearing surfaces, nor of efficient guides; the minimum of vibration to working parts; or of accessibility to all and every part, and ease in overhauling and adjustment.

Bedplates are usually found in two designs: A box section bolted direct on tank top, or a girder section bolted on a built seating. The former necessitates the holding down bolts going through the watertight plating, the latter allows of independent bolting and re-bolting. It is important in any design that the holding down bolts are easily accessible; also that pump facing and jointing bolts are easily accessible. Where an unnecessary depth exists between the tank top and the level of the engine platform, it is a pity that such lost space is not better utilized by making the engine room tank deeper, thereby increasing water ballast or boiler feed capacity.

For the purpose of allowances for wear and tear, I have assumed a period of possibly 30 years. We all know "jobs" of near that age which are, broadly speaking, as good as ever, and I personally lost from my superintendence in 1915 by that cowardly and insane torpedo attack on commerce a Palmer job of 30 years of age, still good for years of seagoing. The double ended boilers had the original furnaces without any patches upon them.

Sizes of engines might be arranged for by leading engine builders on the basis of indicated horsepower, rising by increases of perhaps 500 horsepower per size, from 1000 to 2500 indicated horsepower, to suit the standard hulls that may be evolved and which might give, say vaguely for the purpose of the argument, vessels of 3500, 5000, 7500 and 10,000 tons deadweight. Such standardized engines might, would, or could have cylinders of equal diameter and centers, similar stroke rising, say by 3 inches per size, and similar disposal of valve chests, etc. It would then become possible—making due allowance for individualism in the respective builder's design and finish, and attention to details, etc.—to have the component parts of such standardized engine sets absolutely identical to length, diameter and gage. So much so, that manufacturing firms could specialize in piston rods, valve spindles, connecting rods, crankshaft pieces, thrust, propeller, etc. A builder in this event could even take the surplus or spare parts from another to help forward his own erections, while at the same time a standardization of prices for spares and renewals would keep down unremunerative production and competition. I suggest nothing new in this hypothesis; it is merely carrying into mercantile design on the grand scale what the navy does in types of warships; and that without materially altering general practice, but only consolidating upon output and reducing cost and maintenance.

Reliability is everything in a cargo boat engine. Such steamers trade the world over; to such out-of-the-way places as Mauritius, Ocean Island and Iquique, and places where practically no facilities exist for repair or renewal. A run of a month or two months is nothing nowadays to a tramp steamer, and a run of nearly 80 days, without an easement of alteration of the stop valve, can be vouched for by the writer, for a typical east coast job of 2000 indicated horsepower. Neither the navy nor the passenger services can beat the work of the ocean tramp steamer where reliability comes in. It is important that this feature should not be weakened in any new design. Equally should a steamer's time between ports bear a close approximation to calculation, but it is the shipbuilder and his designer who are chiefly responsible in this matter, and unless the engine builder is a partner in the modelling, the "best all-round ship" will never be produced.

Of Much Interest to Owner

Speed and fuel consumption are the twin factors that the ship owner is most interested in next to deadweight. If a ship can transport 8000 tons deadweight a distance of 240 nautical miles (equal to 276 land miles) in 24 hours at an expenditure of 33 tons of coal, he will not complain. I have such a vessel in mind. She is 400 x 52 x 26 feet, loaded draft with a block co-efficient of 0.78. It may be taken as good practice that the beam of a cargo steamer should not exceed 7½ beams to length, and at such a proportion of hull, good ends are obtainable. The vessel that cannot average 240 miles per day to the River Plate and back is too slow for modern needs and the hustling times ahead. A co-efficient of 0.76 would be better.

As an owner's man, I cannot too strenuously urge that maintenance, as

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an important factor, should be kept in view. A cheap first cost will be a dear investment if its maintenance is costly. There are no rest houses on the long sea routes, and stoppage for adjustment is "bad form" at sea. We don't want the repair gang often on the marine engine, and provision is required for the contingencies of wear and tear.

It seems to me that in the majority of cases there is too little power and too much weight. No cargo boat engines are run at sea full opened out. If they were, the boilers are not capable of maintaining steam. The average tramp steamer lumbers along at a 54-revolution gait with the wheel 2¼ turns back and the links well in. Why not a size smaller engine in the same vessel running at 60 revolutions, with the leads and cut-offs at a calculated maximum of efficiency and a full head of steam in the high pressure chest? The present useless reserve of engine power is only exerted once, and that is at the trial trip, with a good fireman on each boiler, good steaming coal on the plates, clean tubes and fires, and—plenty of refreshments. We want boilers that will steam easily through the Tropics with the wind aft, bunkers of the usual "through-and-through" quality, and the very ordinary fireman based on a calculation of three tons per man on the consumption. This, with tubes unswept for a week, is the proper test for size of boilers in relation to speed.

Reboring Should be Considered

It is for the expert to decide the ratios and clearances, but the calculations should be for sea conditions and not for indicator-card marking on trial trips. The least that should be calculated on in deciding the thickness of cylinder walls and liner, is for possibly reboring the high pressure thrice, the intermediate pressure twice, and the low pressure once, in a probable life of 30 years. It might reasonably be considered that the minimum allowance for reboring a cylinder once would be 3/16-inch for a 24-inch high pressure cylinder, ¼-inch for a 40-inch intermediate pressure cylinder, and 7/16-inch for a 68-inch low pressure cylinder.

Valve spindles frequently come in for renewal, often owing to lack of allowance for turning down; original sizes quite frequently permit only one such treatment. High pressure spindles often require truing up every two or three years regularly. This is due to several reasons—principally, soft material; hard or faulty packing; careless gland adjustment; and wet steam. It is not usually desirable to weld a new end on a main valve spindle. The part working in the guide bush or brasses should be "swelled" and reduced to the rule diameter at each side of the travel to prevent ridging. As regards the method of securing the valve, the clamped (lugged) nut is a very satisfactory arrangement, adjustable to a nicety and safely secured by the screw bolts. Ordinary double nuts are unreliable, and difficult to accurately adjust. Some makers fit a similar clamp over collars, but adjustment has then to be made by washers to take up the slack.

Oversize Shafts Are Desirable

The present revised rules of Lloyds appears ample for all shaft diameters, and, presumably, cover a reasonable wear in the journal, but it is in every way desirable to allow a little over the rule for a possible accident, necessitating a resetting and truing-up in the lathe; or a new journal end or crankpin, necessitating truing up the entire crankpiece. An extra ⅛ inch on the crankpin and journals would cover for this. The shaft should be reversible. Tunnel shafting should be swelled (say ¼ inch) in way of bearings. Propeller shaft should be as short as possible. It is perfectly easy to effect this by carrying the peak bulkhead well back in the way of the after recess.

The propeller is the least considered feature of a marine engine. A steamer is contracted for; machinery to the value of $50,000 is installed; the best of the midship section is appropriated to machinery and bunker space; thousands of tons of coal are consumed annually, and hundreds of pounds paid in crew wages—to turn a chunk of cast iron costing $500. If $100 extra was asked for grinding up and facing smooth the surface of the blades, nine out of ten owners would refuse to pay it. Assuming diameter, pitch and surface to be identical, it does not require much imagination to assume that a bronze propeller, being lighter and thinner, must show better results, and without the assistance of any expert evidence we might reasonably assume an increase of two revolutions per minute, and anything up to ½-knot increase on a 10-knot basis. Yet the first cost of $2500 to $3000 stands in the way of the maximum of efficiency. In a standardized type of ship it will be possible to experiment, and really ascertain the best form, diameter, pitch and surface of a suitable propeller!

In a new design for main engines, the condensers could be of the round-bodied separate type, either placed on brackets at the back of engine or entirely apart. The body could be of cast iron, wrought iron or steel plate. Such detail of design or position would not matter; the chief point for standardization is that the brass tubes should be all the same diameter, length and gage for one or more sizes of engines. The difference in surface would be merely a matter of number of tubes. The great advantage would be the ease of obtaining condenser tubes, as obviously a standard size would permit of stocking by either the engine builder or the manufacturer, or both, to their mutual advantage in cost and time and to the owner in renewal.

Wear Causes Low Pump Efficiency

It is not our province here to compare the ordinary type of bucket—with head and foot valve—with the valveless type having head valves only. The discussion at the Newcastle institution suggested a ratio of diameter, and it is for experts—together with the results of practice—to make due allowances for wear and tear and consequent loss of efficiency. Such mean loss of efficiency in any pump should be the calculation of its power, and not that of a new pump with everything working to technical calculation. The valves should be the same size throughout, but the lifts would naturally vary a little. To prevent the fouling of the engine-room atmosphere, the air pump overflow pipe should have an atmospheric air exhaust. Air and circulating pump rods should be interchangeable. They are so in some jobs.

It is equally important in standardizing main engine parts that the valves, cocks, mountings, pipe flanges and scantlings should be equally considered and standardized for copper, wrought iron, steel, cast iron or lead pipes and connections. There is, or was, a standards committee on such

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matters, including threads, etc., but I am certain their deliberations have never penetrated into marine engine practice, for the variety of fittings and diversity of flange diameters in the engine room is truly bewildering. In this respect there would be a great gain in standardizing on proportions of flange diameter to bore, and pitch and number of bolts, etc.

Much Hinges on Uniformity

It is of more importance than a first thought would be deemed necessary, that the manipulations of marine engines should be more uniform. Engineers come and go—particularly juniors—and mistakes are liable to be made with the variation of present design and practice. Without referring to those differences it is suggested that in a standardized type of engine: All starting platforms should be on the starboard side; all propellers right-handed; all link motions at the front for ahead position; all reversing wheels to work right-handed for ahead —left for astern; all main stop valves in particular, and check valves in general, including tank and bilge valves, right-handed, viz., right-handed to open—left-handed to shut; all engine telegraph dials to face athwartships, viz., the handle, or reply, to be aheadways for ahead, and asternways for astern.

With a new standardized type of marine engine it seems to me that economy in lubrication is deserving of attention At present the sizes of engines we are commenting upon consume an average of 2½ to 3½ gallons of engine oil per day. If solid lubricant, in screw-down spring cups, could be fitted to main shafting, rocking and weigh shafts, eccentric rod and drag link ends and pump links, eccentric straps, etc., it would greatly reduce oil used and wasted, and solve the greasing question.

As to piping arrangements, there seems to be no symmetry or design, nor any provision for an additional supply; or indeed for the required capacity of steam and exhaust areas of auxiliaries if all are working together. A simpler arrangement can be made when junction pieces are introduced for the distribution of the steam services and connections from exhausts brought to a cast iron junction box, thereby simplifying the control to atmosphere, condenser, or to the low pressure chest. It also permits of suitable drainage at all times.

It seems a pity that there are not similar ideas as to the strength of boiler scantlings between the classification societies and the board of trade. One wonders why, at this stage of marine engine and boiler practice, the board of trade should consider that some parts—particularly boiler shells—require, under the rules, such additional thicknesses. The only explanation to the ordinary mind is that their rules require revision in the light of modern improvement of material and workmanship, for if 1 3/16 inches is good enough for a given working pressure for a first-class cargo steamer carrying, say, a crew of 75, why should a small passenger ship, carrying perhaps a total on her certificate of 50 persons, and having a similar size boiler and working pressure require a 1⅜-inch steel plate? I am not giving exact figures, but the difference is an approximation to that named. Where this anomaly comes in to the detriment of the cargo steamer—particularly of the shelter decker or 'tween deck steamer —is when a temporary certificate is required for the carrying of labor emigrants, coolies, troops or similar human freight. For such conditions the working pressure, calculated on the scantling, suffers a quite serious reduction, as also for the British Corp. calculations for crankshafts, etc. If, on the other hand, the machinery is specified to pass board of trade rules, the extra expense and the additional weight to be carried is quite a considerable item. For the main boilers of standardized vessels the chief point that appears to me essential is that furnaces and tubes should be standardized into certain groups of sizes. For instance, based on a working pressure of 180 pounds.

Furnace Sizes Vary Greatly

Furnaces might be standardized on certain diameters, as 38, 40, 42, 44 inches, etc., with lengths to correspond to an agreed practice, and the back ends—preferably of the withdrawal type for easy renewal, as now general practice. The important thing is that a maker could stock ready—or ready to complete to templates—a minimum of standard sizes. Then the difficulty of getting flues for new or renewal requirements would save time. Neither would the make of a furnace matter—particularly of the ribbed or corrugated type—matter if the ends were to a standard fitting. As things are at present, the furnaces are to every conceivable length and fraction of diameter. On this head one might draw attention to the objection to large diameter in furnaces. When these get up to 48 inches diameter the tendency to distortion and sagging is very marked, particularly on long voyages. With furnaces not exceeding 44 inches diameter this tendency is greatly reduced. There is rarely any trouble with flues of, say, 42 inches diameter. It is a moot question whether four furnaces of small diameter are not much better than three of large diameter, notwithstanding the usually accepted objection on the score of firing, or of single or conjoined combustion chambers. The fact remains that there is a very large amount of furnace renewal, and that not on account of age, nor often due to actual neglect.

Parts Should Be Labeled

All important and heavy parts of a marine engine should have the weight of each item cast or stamped on them, so that lifts and overhauls may be attended with the minimum of risk. The boiler should be stamped with its shipping weight and total gallons of water to the level of half-glass. All rods and journals should be stamped with the original outside diameter of the wearing part. Each chamber and cylinder should be stamped at their respective ends with the original bore. Piston and slide valves should be stamped on their top edges with the travel, lap, and leads respectively. All glands should be stamped with the size of packing required for each gland, and, better still, with the depth also. A propeller shaft should be lettered on its inside end as to whether the brass liner is continuous or in two portions. All auxiliary machinery should bear the maker's name, number and size. All valves should be properly brass-labeled to indicate their function.

Finally, if some such standardization and allowances for maintenance could be arrived at by a joint committee of both technical and practical men it would simplify the whole question of specification detail, and secure to the superintendent—on his owner's behalf—those extras and allowances against wear and tear that the practical man feels justified by experience in providing for—on the present basis of specification—more particularly with some firms than with others.

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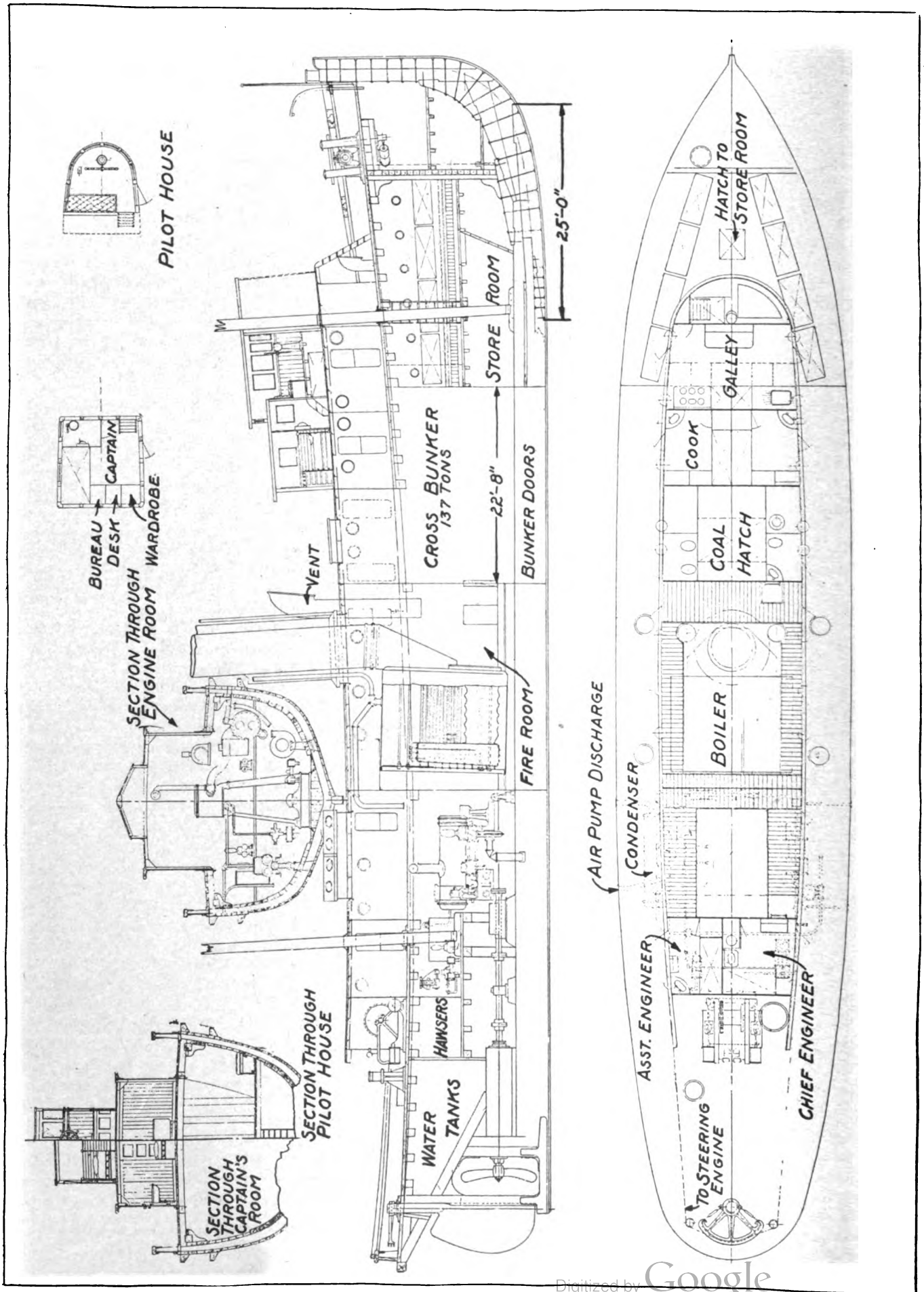

INBOARD PROFILE, PLAN AND SECTIONAL VIEWS AND ARRANGEMENT OF PILOT HOUSE AND CAPTAIN'S ROOM OF 140-FOOT SEA-GOING TUG. EXCEPTIONAL CAPACITY FOR FUEL IS PROVIDED.

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Book Review

Steel Ships: Their Construction and Maintenance, by Thomas Walton; cloth; 332 pages, 6 x 9 inches; published by Charles Griffin & Co., Ltd., and furnished by THE MARINE REVIEW for $7.00.

Shipbuilding holds the center of the stage at the present time and for this reason the fourth edition of Mr. Walton's book, which has become a standard reference, is particularly timely. As in previous editions, the book contains authentic information of value to the shipbuilder and others interested in martitime subjects. Much new material has been added which includes the Isherwood system of framing, late developments of turret, trunk, single-deck and other types of steam vessels, details regarding the building and launching of the LUSITANIA and MAURETANIA and other timely subjects.

The book is carefully written. In preparing the first edition, much of the material of which appears in the present issue, the author spent four years. The first two chapters that deal directly with iron and steel were written from knowledge gained by the author while making a study of the subject in the Cleveland district of England. The subsequent chapters were written from actual experience encountered by the author in his every-day vocation. The book is well illustrated and the drawings from which the majority of the illustrations were made are well executed. The illustrations are placed in close juxtaposition to the portions of the work to which they refer, thus affording quick reference. The whole subject of ship construction has been treated from a practical point of view and the requirements of students, shipyard superintendents, shipbuilders and marine engineers have been carefully studied.

The work begins with a comprehensive account of the manufacture of iron and steel, the author deeming it necessary that a fundamental knowledge of this subject be acquired by those interested in steel shipbuilding. This is followed by tests of strength and quality of ship steel. While the subject of ship classification is sometimes confusing, the book in question explains it in detail. Ship stresses and strains also come in for complete and detailed discussion.

A full description of the fundamental types of vessels known as full scantling, spar decked, awning decked and modifications of these types are included, together with descriptions of typical vessels.

A large section of the book is devoted to ship structure in all its varied parts, including framing, plating, stern frames, rudders, riveting, pumping, ventilation, etc. This section also includes data on launching.

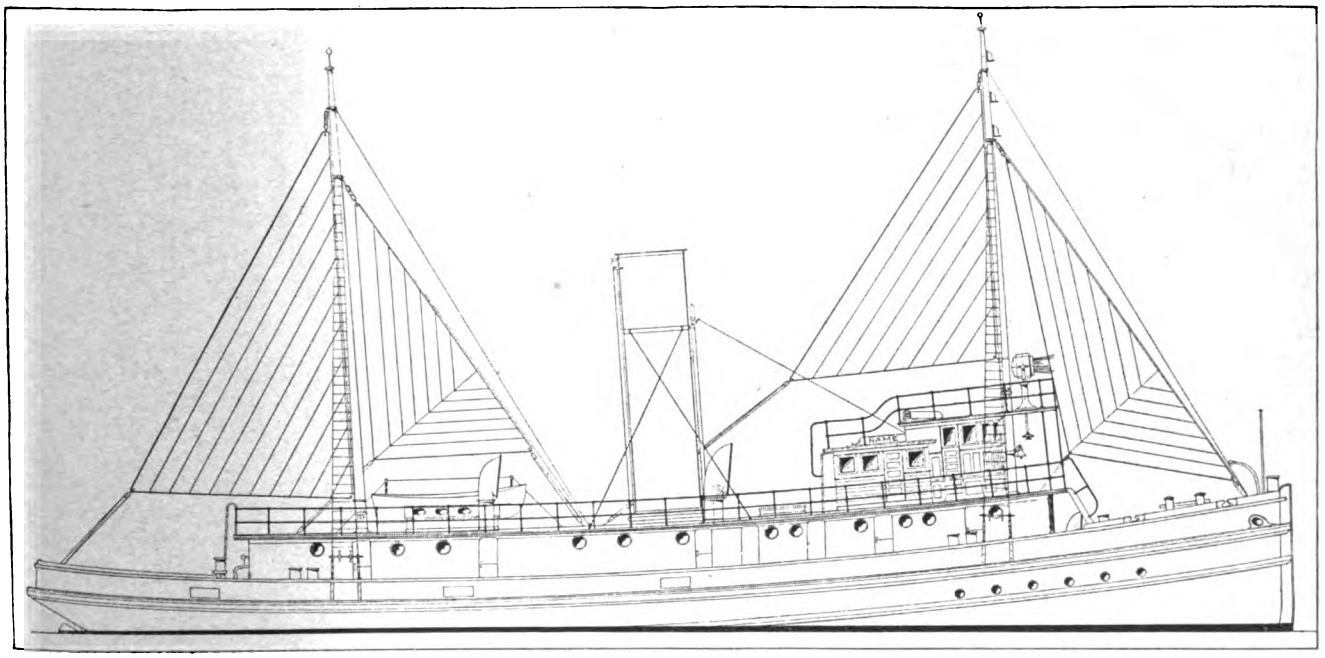
The book closes with a chapter devoted to the causes of decay and deterioration and particular attention is given to the parts of ships most liable to rapid corrosion. The best means for combatting corrosion are given, together with other suggestions for preserving and maintaining ships in a state of efficiency.

Tug Built for Transatlantic Service

A SEA-GOING tug embodying some unusual features has been built by the Northwest Engineering Works, Green Bay, Wis., for the United States shipping board from designs and specifications by J. Murray Watts, naval architect, Philadelphia. One of the outstanding features is the large amount of coal carried, provision being made for a normal capacity of 200 tons, while 250 tons can be carried for a transatlantic trip.

As the tug is designed especially for long ocean voyages, accommodations are provided for an unusually large crew, the forecastle of this 140-foot craft containing bunks for 16 men. The deckhouse also is of unusual construction, strength being the primary requisite. It is built throughout of steel with extra large, brass rimmed portlights and doors fitted with special reference to absolute water-tightness.

The accompanying designs show the sturdy character of this craft, whose dimensions are 140 feet over



OUTBOARD PROFILE OF SEA-GOING TUG, SHOWING AUXILIARY SAIL ARRANGEMENT

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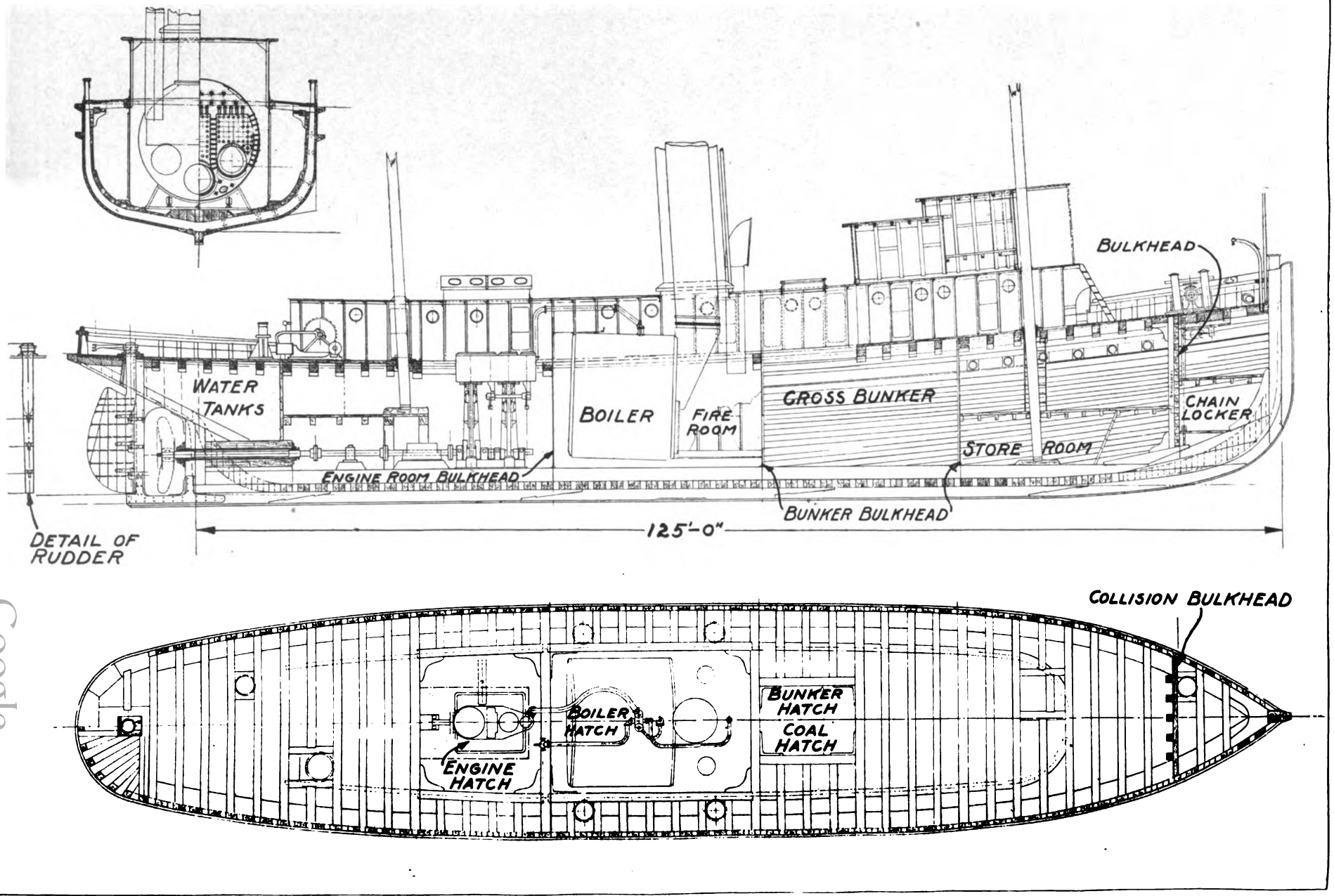

INBOARD PROFILE, PLAN AND SECTIONAL VIEW OF BOILER ROOM—THIS DIAGRAM SHOWS MANY OF THE IMPORTANT DETAILS—THE CRAFT CAN BE TURNED IN ITS OWN LENGTH IN EITHER DIRECTION

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all, 27-foot beam and 14-foot 6-inch molded depth. She has a water tank capacity of 85 tons, steam being supplied to her engines at a pressure of 185 pounds by a Scotch boiler, 14½ feet in diameter and 12 feet long, with a heating surface of about 2200 square feet and a grate surface of 72 square feet with three 44-inch corrugated furnaces. The boiler operates under natural draft.

Propulsion is by a vertical, inverted, compound engine with cylinders 18x38 inches, with 26-inch stroke. The propeller's diameter is 9 feet, with 12-foot pitch. The auxiliaries consist of an 8-inch centrifugal pump and engine with cylinders 6x6 inches, two feed pumps worked from cross head, air pump worked from cross head, fire pump, duplex pump, 10x6x10 inches, donkey pump 7½x5x6 inches, steam windlass with cylinders 6x8 inches, combined hand and steam steering gear with cylinders 4½x4½ inches, a five-kilowatt generator driven by a De Laval turbine and one steam-towing machine with cylinders 6x6 inches.

The main steam pipe from the boiler to the engine is six inches in diameter and has a gooseneck to allow for expansion. The auxiliary steam pipe is three inches in diameter. Directly above the boiler is a steel platform for drying the hawser. The main exhaust leading to the condenser is a copper pipe, 12 inches in diameter. The condenser, circulating and sanitation pumps are located on the port side of the engine while the fire pump is on the starboard side. Steam is conveyed to the steering engine through a 1½-inch pipe.

Has Three-Inch Planking

The keel is 12x15 inches and 3-inch planking is used, while the center keelson is 12x18 inches and the ceiling four inches thick, with bilge strakes 6x9 inches. Her timbers are 8x11 inches, tapering to 6x6 inches, in double rows, their centers being two feet apart. Some of her deck beams are a foot wide.

There is a stateroom with separate toilet aft of the pilot house for the captain and at the after end of the deck house is a large state room on the starboard side for the chief engineer, and a state room on the port side for two assistant engineers. At the forward end of the deck house just back of the galley is a state room on the starboard side for the mates, and a state room for the cook and boy on the port side. The galley is unusually large, being 16 feet long with a maximum width of 15 feet. A large icebox is provided on the starboard side forward and the cookstove is aft on the port side. The usual sink, provision lockers, coal lockers, mess table and shelves are arranged with respect to the greatest convenience of the cook.

U. S. Yards Can Meet All Competitors

(*Concluded from Page* 173)

troop and cargo movement. Mr. Hoover's program for European relief required last month more than 15,000 tons of ships per day. Also we have the Belgian relief and other pressing demands such as rationing of Switzerland, Denmark and Italy. Thus it is still a case of ships and more ships. At our best we are sorely neglecting important trades, including overseas berths for general cargo as well as tonnage for cotton which should now be moving in large tonnage.

The results may seem poor and I am sure are most disappointing, and I want to say earnestly to you that we are entirely conscious of the situation and are doing everything in our power. We now hope to find the strain easing by the end of April and when navigation from the lakes opens we will have a lot of new ships. While these lakers are small we can put them to work with advantage in certain trades and thus release other ships to other trades.

In conclusion let me urge you to consider carefully how much our merchant marine means to the industrial and commercial structure of the country. I am hopeful that some day we will have a regular line of steamers sailing on regular schedule to all ports of the world. I have strong convictions on the importance of coupling the railroad with the ships. We must get away from a lot of old fallacies and by law must sanction and enforce principles which were formerly held unlawful. Instead of divorcing ship from railroad a unified and harmonious program must be worked out. If we are to bring to the whole country the proper benefits of a mer chant marine, the small shipper must be given an opportunity of sending his goods to all overseas markets. In a word the ship must be the extension of the railroad. It should be arranged so that a manufacturer, at say Akron, who had nothing more than one or two cases of his goods to ship to Melbourne or Buenos Aires or Cape Town, could go to the railroad agent and ascertain by reference to the ordinary railroad guide when and from what port the next steamer would sail. And, having his goods packed and delivered, he could go to the railroad agent and secure a through bill of lading so that in turn he might negotiate a draft with his bankers.

A brief word as to government operation, I believe it to be impracticable and prejudicial so far as concerns railroads. *As to ships, it is utterly impossible.* I could pile up numberless arguments and illustrations on this point but I will content myself in repeating that government operation of ships would be absolutely destructive to our aspiration. In unscrambling the railroads I trust it will be arranged so that we will have at least two competitive lines to all the principal ports of export and import, and as to ships, that it will be arranged, by a sort of franchise system, that lines will be encouraged, and supported if necessary, by the government in consideration of regular sailings, announced a year in advance, and that the government maintain a control as to maximum rates.

Surveying the world as our market I have in preliminary form sketched more than 20 lines in regular service to foreign destination. This includes regular sailings from Atlantic, Gulf and Pacific ports. Reflect on what this would mean. You are all business men—explanation and emphasis by me is not necessary.

There is much to be accomplished. The program is short but to clear the road many prejudices have to be overcome and selfish interests stifled. If you see the vision and realize its importance set to work with determination to awaken the public mind. Without a popular and insistent demand we cannot expect to succeed. It must be brought home in a selfish way to all classes of people—the shipworkers, the farmers, the factory workers, the railroad men, the manufacturers and the bankers.

Death of T. C. Morrison

Thomas C. Morrison, secretary and treasurer of the Harvey-Morrison Co., vessel operator of Cleveland, died Feb. 26 of pneumonia. He was 33 years of age and had been associated with R. H. Harvey since the incorporation of the business in 1905.

For eight years the company operated the JESSE SPALDING carrying coal and rails. From 1913 to 1916 the company operated the SPOKANE carrying newsprint paper from the Soo to Detroit. Later the company purchased the package freighter LEHIGH. This vessel was converted into a bulk freighter, the first reconstruction of this kind ever carried out. In 1918 she was sold to Cuban interests. She could not be transferred, however, so the company operated her on the lakes.

Mr. Morrison had been associated for 15 years with his father, Frank Morrison, who is the oldest compass adjuster on the lakes. He is survived by his widow.

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Engine Reverse Gear Eliminated

Craft is Fitted With a Novel Rudder That Maneuvers the Boat in Any Direction—Helmsman Has Full Control

INTERESTING experiments were lately conducted by the General Electric Co., New York, with a small power boat equipped with a novel device for reversing and maneuvering without reversing the engine. The boat is 25 feet overall and is owned by W. B. Landreth, deputy state engineer of New York. The object of the experiments was to determine the advisability of equipping large vessels with the control gear, more especially vessels driven by turbine engines. The accompanying illustrations show the device and indicate the maneuvering ability. All the handling is done by the man at the helm while the engine takes care of itself.

This boat is capable of backing up with the engine running in a forward direction but the most valuable feature is its ability to turn around in its own length. With this rudder the boat can be maneuvered without steerageway, that is with the rudders placed at right angles to the axis of the keel and with engine running at full speed, the boat will stand perfectly still and then by making a slight adjustment of the rudders, the boat will turn around in its own length and continue to do so until the adjustment is changed and during the process of this circular motion it can leave for any point of the compass at full speed.

As an illustration of the maneuvering qualities of the rudder, this boat was run into a 40-foot slip full speed ahead, turned around and came out bow first without touching either side of slip.

The rudder on the Landreth boat is the invention of H. O. Westendarp, of Boston. It consists of two steel plates, 3/16 of an inch thick, each plate the same size as the normal rudder used on this type of boat. The rudder post consists of a steel rod inside a steel tube, one plate of the rudder is attached to the tube and the other to the rod. The boat is equipped with two steering wheels, arranged side by side, one wheel to operate the rudder affixed to the tube, and the other the rudder fastened to the rod. The manner in which the rudders are affixed to the stern of the boat is shown in the illustration. The view at the right shows the two rudders close together in the position for normal cruising when they are used the same as an ordinary rudder.

How the Boat Reverses

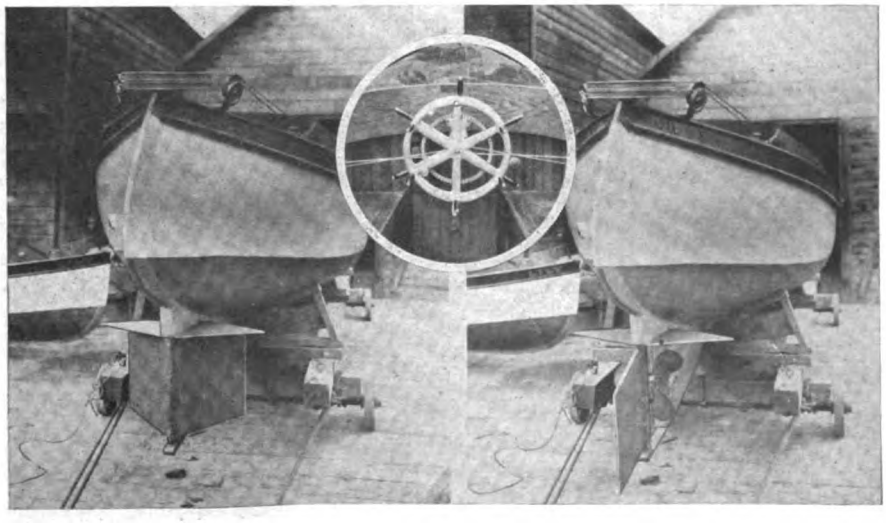
The two steering wheels are on the same axis and when locked together operate as one wheel for ordinary cruising. But when the boat is to be turned sharply or reversed, the wheels are instantly released so that they may be revolved in opposite directions to manipulate the rudder plates.

With a few turns of the wheels the rudder plates are set in V-shape as shown in the view at the left—and with the propeller running full speed ahead the boat almost instantly stops and starts to run backwards. The experimental boat was brought from full speed forward to backing in nine seconds. With the reversing gear originally installed on this boat it took 26 seconds to back. The reversing speed can be controlled to any degree by increasing or decreasing the angular positions of the rudders.

The reversing motion is imparted by a stream of water thrown back against the rudder by the propeller and projected thereby forward along the sides of the boat toward the bow. The speed of this water is sufficient to propel the boat backwards at about 30 per cent of the full speed ahead. It will be noted that there is a steel plate, or fin, above the rudder which prevents the water thrown back by the propeller to escape over the top of the rudder. This fin assists in directing the water forward along the sides of the boat.

This experimental boat was equipped with the new rudder without any changes to speak of. It was discovered, however, in these experiments that the angle of the supporting rod must be 90 degrees, or more, with the propeller shaft. The diagrams shown herewith indicate clearly the position of the rudder blades for the various cruising directions.

Without a doubt the device should prove a valuable adjunct to users of small power boats particularly among fishermen for handling their nets.



The view at the left shows the rudder set for full speed astern. The plates over the rudder aid in directing the current set in motion by the propeller. At the right the rudder is set for going ahead. In this position the two sections are brought together. The center insert shows the controlling device which consists of a supplementary wheel installed in front of the steering wheel. The spokes of this supplementary wheel are placed horizontally.

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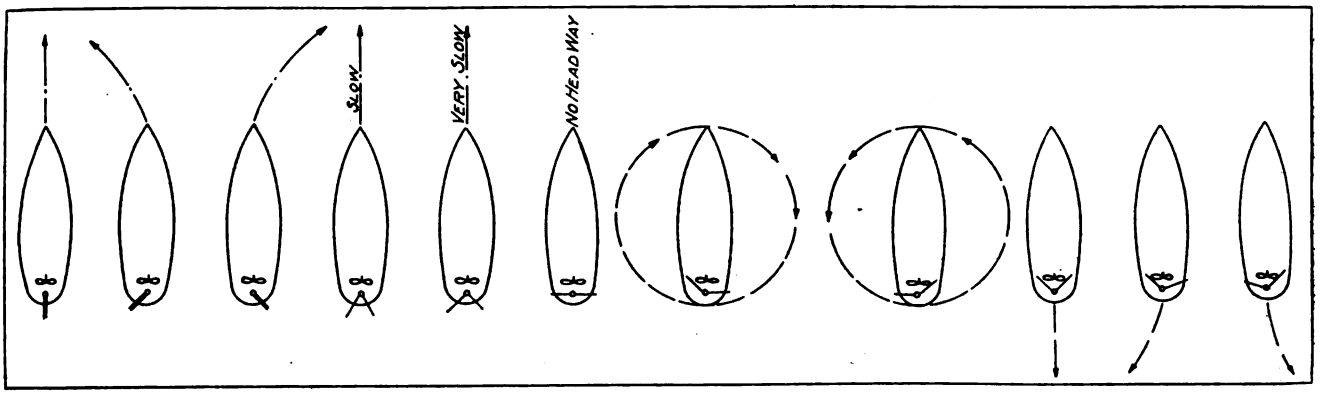

DIAGRAM SHOWING MANEUVERING ABILITY OF PATENTED REVERSING AND CONTROL RUDDER

With this device they could use a solid shaft, solid propeller and always keep a constant load on the engine.

How the device will work out on a large vessel, however, is a question for future solution and this probably will be decided through actual tests within a short time. If practicable for large craft, the device should prove particularly valuable for installation on vessels equipped with turbine engines to permit of ready reversing.

Forced Lubrication for Marine Turbines

AN editorial in a recent issue of *Engineering*, London, discusses forced lubrication for marine turbines, and points out that with the general adoption of turbines on all classes of ocean vessels, in most of which, unlike the English navy, there are only two engineers on watch, it has become necessary to give the subject of lubrication considerable thought with a view to obtaining a degree of simplicity and dependability which will reduce attention to a minimum. As every trade route has its own conditions, it is impossible to devise a system suitable for every class of ship, but the following system is claimed to meet the requirements of many single-screw cargo-carrying vessels in the ordinary trade routes.

The article describes a combined gravity and forced system consisting simply of a pump taking oil from a drain tank and discharging it through a cooler to a gravity tank, from which it falls to the turbine bearings, etc., and back to the drain tank; or it can be by-passed, in which case it does not enter the gravity tank but is forced direct to the machinery. The following main fittings would be required for such a system, and are stated in the order in which the oil would pass through them when traveling from the drain tank to the turbines: One drain tank; two oil strainers, one for each pump; two pumps, one working and one stand-by; one oil cooler; two gravity tanks; one combined oil distributor and water-and-sludge collector.

The drain tank should be of sufficient capacity when full to supply oil for 15 minutes, assuming that none is returning to the drain tank. It should be a self-contained unit placed in a cofferdam in the double bottom rather than built into it, and should be easy of removal for examination. The top should be not less than six inches below the bottom of the gear case to insure a ready drain, and not less than three inches above the double-bottom tank to clear bilge water. In addition to the drain and suction-pipe connections a float-level indicator can be fitted so as to be easily observed from the starting platform.

The body of the oil strainer may be of cast iron, having a cover easy of removal. The straining grid may be a gun-metal casting or a steel tube perforated with holes, say, 1 inch in diameter, but in either case the area through the grid should be about 10 times that of the suction pipe. A suitable straining medium is a 24-mesh wire gauze, which should be properly secured to the grid. The gauze will, however, reduce the effective area through the grid by about one-half.

The oil cooler may take the same form as a steam condenser, with similar tubes and packing, but with the water circulating around the outside of the tubes with preferably a four or six flow to insure good circulation. As, however, it is economically impossible to render the flow of oil turbulent, which makes the rate of heat transfer low, certain firms construct their coolers in a different way. The water is passed through the tubes, and the oil outside. Numerous baffles are fitted to cause the oil to flow up and down in zigzag fashion across the cooling tubes, and at each abrupt change in direction a certain disturbance is produced in the laminar flow of the oil, which facilitates the interchange of heat. At present, knowledge of oil coolers is in its infancy and there is much room for research and careful design. The present practice admits of oil discharging to turbines at 80 degrees Fahr. and leaving them at a maximum of 120 degrees Fahr.

The combined oil lubricator and water-and-sludge collector need be nothing more than a cylindrical casting of sufficient depth to admit of water and sludge gathering at the bottom while oil flows out at the top to the bearings and gear sprayers. It is desirable to fit separate connections from the distributor to the bearings and gear sprayers with a controlling valve at each, which facilitates adjustments whereby bearings and sprayers will each receive their proper share of the oil. A water draw-off cock placed about 12 inches from the bottom and a door for removal of sludge are to be provided. The turbine pipes and fittings should be tested to 50 pounds per square inch, with the exception of the tanks, for which a 5-pound test is sufficient. A relief valve should be provided near the pump, set to blow off at 50 pounds per square inch and having an outlet led to the pump suction.

American Lumber Co., Millville, Fla., formerly owned by Germans and taken over by the alien property custodian, is building a ship for the Emergency Fleet corporation.

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Effect of Air Tools on Workmen

Cold Weather Was Found to be the Major Cause of any Ailments Which May Arise from the Use of Pneumatic Tools

By Francis M. Barnes Jr., M. D.

THE introduction of mechanical tools into the trades has ever been accompanied by numerous actual and claimed damages to their operators and also a more or less direct cause of the occurrence of new and particular diseases or the factor predisposing to the incitement of ordinary diseases in greater prevalence. Among such mechanical tools the pneumatic hammer, in comparatively recent years, has come to occupy a most important position in several lines, notably in shipbuilding and in the steel and stone industries.

Within the past two years complaints of ill effects from the use of the hammer have become prevalent although these do not seem to have originated so much with the individual user of the hammer as with labor organizations of which he is a member. It has been claimed that the use of the hammer produced in the men a diseased condition affecting the nervous system and leading even to paralysis, insanity or other form of complete incapacitation.

Decide to Investigate

In view of the fact that in current medical literature no mention of such diseased condition from this causation could be found it became necessary to carry out an investigation to determine, if possible, whether such disease actually did eixst, its extent and seriousness, and, if necessary, to study measures whereby its occurrence could be minimized or entirely done away with. Such a study is obviously of importance, not only to the workman, but to the operator whose interests are more broadly involved.

Recent investigations have been carried out in parts of the country where the pneumatic hammer is used in shipbuilding and in the steel industry. From reports of such investigations as are available it was not found, in any instance, that the use of the pneumatic hammer produced any deleterious effect upon the general health of the workers.

So far as this study is concerned the men using pneumatic hammers on limestone were found to be in good general health and none of the group examined showing any constitutional disease; their troubles (supposedly arising from use of the hammer) being limited to a disturbance of the function of the left hand—commonly known as "white fingers" or "dead fingers." As a general thing this condition occurs shortly after the men first go to work in the morning, or until they have "warmed up," although it also occurs during cold weather when the hands are exposed otherwise than in working.

Investigate New Field

PNEUMATIC tools occasionally are held responsible for various ailments of a somewhat indefinite nature. Thoroughly to investigate this question, the author of this paper made an exhaustive study of the effect of the use of pneumatic tools on the nervous system and he draws some interesting conclusions. His investigations failed to show any trace of Raynaud's disease, acroparesthesia, neuritis or occupational neurosis.

It was disclosed that the use of pneumatic tools in cold weather may cause "white" or "dead" fingers, and to overcome this condition the author recommends that some method be devised to warm the cutting tool in cold weather and to enlarge the shank so that the worker can grip it without causing finger cramp. He also urges that the practice of blocking the exhaust outlet and thereby forcing a current of cold air over the fingers of the left hand be discontinued.

First the little finger and ulnar side of the left hand (in right-handed men) become pale and blanched; the same area soon giving rise to tingling or numbing sensations, sometimes even to slight pain. The ring finger and part of the middle finger may also be involved in this process. By swinging the arms or rubbing the hands the condition may be made to disappear and when the hands are warmed the pallor rapidly gives place to diffuse flushing and reddening. The index finger and thumb of the right hand are occasionally affected, particularly in those workers who improperly control the exhaust by their finger or thumb.

So far as could be determined this condition of the hands constitutes the sole trouble from which the stone workers complain in so far as the pneumatic hammer is concerned. In all of the workers examined the hands were somewhat reddened and flushed, but not more than reasonably might be expected in the hands of outdoor workers. The hands were calloused to a varying degree in different subjects, but in all quite extensively. The palm and certain of the fingers of the left hand were more calloused than on the right. There was no actual cyanosis, excepting in one subject, where this was slight. No swelling, no tenderness, no pain, no edema and no involvement of the muscles or joints. Paresthesia was absent excepting in one subject, who reported some numbness in his "white fingers." This was the only subject to show the condition well developed. Sensation for all tests was acute and practically normal. In most subjects there was a lowering of acuteness of feeling—some blunting or dulling—but this certainly was no greater than could be expected in hands where so much callous was present. In all but one subject the callous was sufficient explanation for any variation from the normal which could be observed in sensation. In this one subject the sensory disorder passed off in a few minutes or as soon as the hands became warm. Mental disease was not present in any subject examined, nor was there any physical disease which could in any way be attributed to the occupation.

Cold is Responsible

Such disorders of the extremities indicate quite clearly that a disturbance of the peripheral circulation of the blood is responsible for their occurence. The caliber of the peripheral blood vessels, and therefore the amount of blood supplied to the part, is dependent in large measure upon the action of the nerves which supply these blood vessels, known as vaso-motor nerves. Low temperatures stimulate the sensory nerve fibers in the skin and the nerve

Abstracted from a paper presented at the seventh annual safety congress of the National Safety Council.

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impulses thus aroused reflexly stimulate the vaso-constrictor center, or a part of it, and cause blanching of the skin. That cold may produce evident changes in the appearance of certain parts of the body, notably of the extremities—the feet, hands, ears and nose—is a matter of common observation.

It has been pointed out that exposure of the hands to cold usually produces at first a pallor of the skin which is evidently due to a constriction of the cutaneous arterioles. When the exposure is prolonged, however, the color is heightened and the skin usually becomes more or less cyanotic. Almost universally, therefore, cold produces a constriction of the cutaneous arterioles and a slow flow of blood through the skin. The variations in color are thus caused by the varying amounts of blood that collect in the skin capillaries. The flow through the blood vessels is also in part influenced by the muscles which surround them. Anything, therefore, which interferes with or impedes the normal action of the muscles will have its effect in turn upon the circulation, as it is the changing state of contraction and relaxation of the muscles which aids in the flow of blood under normal conditions. Where a group of muscles is held in a contracted state for a considerable length of time the circulation is thereby impeded.

With the workman, whether using a chisel and mallet or a pneumatic hammer, the factors of cold, continued muscle contraction and cutaneous irritation are all present to a considerable degree and demand due evaluation in the consideration of such disorders in the hands as are sometimes observed. The fact, borne out with uniformity in this investigation, that the trouble occurs only in cold weather indicates most conclusively that the low temperature itself is one of the most important factors in the causation. The continued muscular contraction and the mechanical irritation (vibration) may play a role in its causation, but evidently these are of secondary importance.

Hammer Hand Not Affected

The fact that the trouble, when present, pre-eminently affects the left hand, which holds the chisel and not the hammer, indicates clearly that other factors than the hammer itself are of more signal importance in its causation. The cramped position of the chisel hand with the more or less continuously maintained contraction of the muscles is one of these important factors. However, the hammer or the grip of the chisel, either alone or combined, are not sufficient to produce the condition, as is proved by the fact that it does not occur in the warmer seasons of the year when industry is at its height. The role of the vibration is uncertain, but as the trouble occurs in the hand not holding the hammer, it is doubtful if this factor is of much importance. We have left, therefore, the factor of low temperature which seems to be the final and most important element in the production of those vascular changes seen in the hands of some workers which, although physiological in nature, form the pathological basis for the occurrence of "white fingers" and "dead fingers." So far as can be ascertained the condition leads to no permanent disability and results in no organic disease. Why it is that only a portion of stone cutters are affected cannot be answered. Whether certain undetermined conditions of poor general health or specific diseased condition existing, but not recognized, predisposes certain men to this disturbance is not evident from this investigation, although apparently such is not the case. With one or two exceptions they were all well developed, robust men without demonstrable general physical or mental disease.

Draws Interesting Conclusions

Conclusions drawn from a comparatively small series of observations must be subject to some limitations. However, the uniformity of the results of the examinations made in this investigation, taken together with the testimony of the workmen and of others, reasonably justifies the following deductions:

1. Structural steel workers, shipbuilders and stone cutters as a class, enjoy good general health and are not, because of their trade, especially susceptible to any particular disease.

2. Stone cutters are liable to a disorder affecting the hands, especially the left hand.

3. This disorder of the hands is of a vascular character, not due to organic changes in the circulatory system, but dependent upon vaso-motor reactions.

4. These reactions are physiological in character and are occasioned by three factors incident to the work of stone cuttng: Mechanical irritation of the skin, continued muscular contraction of a cramping nature and low temperature.

5. Of these three factors, cold is considered the most important because the condition only occurs during the severely cold weather and never in the summer, and warmth and measures to restore the circulation (rubbing, swinging the arms and the like) cause its disappearance.

6. It cannot be caused by the effect of the air hammer alone because it occurs in those who have not used the air hammer. It does not occur in warm weather when industry is at its height and, therefore, when the air hammer is most in use. It occurs mostly in the left hand and not in the right hand in which the hammer is held.

7. The vasomotor disorder is of temporary duration and is not known to have resulted in permanent disability of the hand, nor itself to have been the cause of development of any other local or constitutional disease.

8. It is possible that once having occurred the person is rendered more susceptible to its reappearance, just as is the one who had had his ears or fingers frostbitten by the cold is more susceptible in these parts to the subsequent exposure to cold. This explains the occurrence of "white fingers" when not actually engaged at cutting but otherwise exposed to low temperatures.

9. There is no sufficient reason in the signs and symptoms presented in this disorder to conclude that one has to do with Raynaud's disease, acroparesthesia, neuritis or an occupational neurosis.

10. The institution of measures to warm the chisel before and while using, enlarging the shank of the chisel and covering it to make it possible to hold without so cramping a grip, the wearing of gloves, and the discontinuance of the prevalent custom of blocking the exhaust outlet, and thus forcing a draft of chilled air out along the chisel and onto the fingers of the left hand would do much toward the prevention of this trouble.

Late Marine Patents

Copies of the following patents can be obtained by sending 15 cents in stamps to Siggers & Siggers, National Union Institute building, Washington, by mentioning THE MARINE REVIEW:

1272834.—Water-tight bearing for propeller-shafts and the like. A. R. Middleton, Wayside, Md.

1272680.—Torpedo snare, Alfred M. Lane, St. Louis.

1272683.—Explosion-engine. Isidor Lesem, Wichita, Kans.

1273149.—Pleasure cruiser. Irwin Chase, Bayonne, N. J.

1273176.—Rowing boat. Charles J. Olsen, New York.

1273298.—Lifeboat. D. A. Whitaker and H. A. Thayer, Sacramento, Cal.

1273315.—Davit tackle block. J. T. Bell, deceased by Josephine T. Bell, adm., San Francisco.

1273330.—Torpedo-repelling device. M. Ciganenko, Pittsburgh.

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"Stone Ships Cheaper Than Steel"

—Wig

Twenty-Year Operating Period for Steel and Concrete Vessels, Including Initial Cost and Fuel Charges, is Basis of Comparison

INFORMATION compiled by the government indicates that the concrete steamer is a competitor of the steel ship, both in cost of construction and propulsion under present conditions and under the conditions which it is expected will prevail during the more normal times of the immediate and ensuing post-war period. The only element of doubt that enters into this statement is whether the life of the concrete ship is equal to the life of the steel vessel, according to R. J. Wig, head of the concrete division of the Emergency Fleet corporation, who is now on the Pacific coast, inspecting the government's concrete shipbuilding yards at Oakland and San Diego, Cal. Based on exhaustive investigations, which have been in process since the inception of the idea to build the pioneer concreter FAITH, Mr. Wig and his department have finally arrived at the conclusion that the concrete steamer cannot only be built more economically than the steel vessel of similar deadweight capacity and speed, but that the combination of propulsion costs for 20 years and the construction costs is considerably lower in the case of the concrete craft than it is in the case of steel steamers.

This comparison of the life of the two types of steamers only Time itself can make. Neither Mr. Wig, nor any of the other authorities on the Pacific coast interested in concrete shipbuilding are prepared to say that the concrete steamer will be *the* ship of the future. At the same time, confidence in the efficiency of the stone ship as a cargo carrier—perhaps even more so as a passenger carrier—is increasing in almost direct proportion with the progress of the work in the government yards.

In regard to the passenger carrying possibilities of the concreters, Mr. Wig says: "The concrete steamer has greater rigidity and less vibration than the steel vessel. Weight is of less importance in passenger service and I do not think it will be denied that the concrete steamer is a much easier riding vessel in every respect than is the steel carrier. The concrete steamer can be engined to make just as high speed as the steel vessel and in comparing the two types there are many elements more favorable to the concrete than to the steel steamer for passenger service."

Mr. Wig has prepared figures and details, shown in the accompanying table, on the relative values of the cost of constructing and propelling concrete and steel ships both at present prices and at expected post-war prices. A comparison of the figures for the two periods has a special significance when they are considered as being indicative of the government's own forecast of the conditions which will prevail in the shipbuilding and operating fields when more normal times ensue.

The government assumes, for instance, that steel tankers may be built for $100 per ton in the actual post-war period, as compared with a present cost of $240 per ton. The present cost of building a concrete tanker is given at $180 per ton and the expected post-war price at $75 per ton. The cost of fuel oil will drop, the government thinks, from the present price of $2.75 per barrel to a cost of $1.75 per barrel in the post-war period.

Table I

Comparison of Concrete and Steel Tankers

	7500-ton concrete tanker	7500-ton steel tanker
	Characteristics	
Length, feet, inches	420 0	392 0
Beam, feet, inches	54 0	51 0
Depth, feet, inches	36 0	31 2
Draft, feet, inches	26 0	24 0
Displacement, tons	13,000	10,650
	Values of I. H. P. at various speeds	
	Knots, 10½ 11½	Knots, 10½ 11½
E. H. P.....	990 1320	886 1208
Efficiency	0.50 0.50	0.50 0.50
I. H. P.....	1980 2640	1772 2416

The government, it is thought, even in its most sanguine moments, does not expect that the shipyards of this country, either publicly or privately owned, will be able to compete on an even basis with British yards in the economical production of steel ships. It is stated that the British yards expect to turn out steel vessels at a rate somewhere in the neighborhood of $75 a ton. The government in estimating the post-war possibilities of shipbuilding in this country is assuming that steel ships built here will cost $100. According to advocates of concrete ships, this supports the conclusion that America should promote the production of concrete steamers which, according to Mr. Wig's figures, can be built and propelled for less, under the assumed post-war conditions, than can the steel ships.

Of course this balance in favor of the concrete steamer applies only when vessels of the two types are compared in which there is a large differential in construction cost. The government presumes that concrete steamers can be built originally so much cheaper than steel craft, that the lower first cost of the concrete vessels will more than offset the higher cost of the greater amount of fuel oil used in the propulsion of the stone boats. For instance, at the prices prevailing on Jan. 22, the government gives the present value of cost of constructing and propelling for 20 years a concrete tanker of 7500 deadweight tons with a speed of 10½ knots at $2,839,494 as compared with $3,133,032 as the value of cost of building and propelling a steel tanker of the same size and speed for a similar period. The total for the concrete tanker includes $1,350,000 as the total cost of construction and $1,489,494 as the present value of cost of fuel oil as compared with a building cost of $1,800,000 and a present value of cost of fuel oil of $1,333,032 for the steel tanker. In other words the concrete tanker, under present conditions, would cost less to build and more to propel for 20 years than the steel tanker; but the total cost of both building and propelling the concrete tanker for 20 years would be less, it is claimed, than the cost of building and propelling a steel vessel of the same capacity, type, and speed. Under post-war conditions, the government expects to obtain a present value of cost of construction and propelling a concrete vessel of this type for 20 years of $1,510,362 as compared with $1,598,290 for the steel tanker.

The building of the 7500-ton concrete tankers at the government yards at Jacksonville, Fla., Mobile, Ala., Wilmington, N. C., San Diego and Oakland, Cal., is an unprecedented feat in reinforced concrete construction, according to the Emergency Fleet corporation's resident representative at Oakland, Captain Hynds. The concrete aggregates being used in the pouring of ships at the Oakland yards have a weight per cubic foot of only

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from 110 to 115 pounds, as compared with a weight of 135 pounds per cubic foot used in the construction of the FAITH. Ordinary concrete weighs something over 150 pounds per cubic foot.

The ten 7500-ton concrete tankers now being built at the government yards are each 420 feet long with a 54-foot beam and 36-foot depth, displacing 13,000 tons and drawing 26 feet of water. The yards at Mobile and Oakland, which are the furtherest along on the tanker construction, will each build a concrete cargo carrier upon the completion of their tankers. The 10 tankers and the two cargo carriers represent the total concrete building program of the Emergency Fleet corporation as it stands today, Mr. Wig says. It was originally intended that each of the five yards should build eight boats each, but this was reduced.

The head of the concrete division of the Fleet corporation does not care to make any predictions as to the future of government concrete shipbuilding. "The whole matter is in the hands of congress," he said. "The Emergency Fleet corporation has canceled every order that it could. Appropriations have already been provided for these concreters. Whether any more will be built rests entirely with congress."

Mr. Wig is in full accord with the statement of W. Leslie Comyn, president of the San Francisco Shipbuilding Co., which built the FAITH, regarding the gloomy outlook for the American merchant marine unless some form of subsidy to the ship operators is provided by congress. "The concrete boat is all right," Mr. Wig said, "but there is not going to be any merchant marine unless adequate monetary support is given the ship operator to enable him to compete with lower cost nations on the seas."

Table II

Comparative Costs of Constructing and Propelling Concrete and Steel Tankers

Present Prices

RELATIVE PRESENT VALUES OF THE COST OF CONSTRUCTING AND PROPELLING CONCRETE AND STEEL SHIPS

(7500 Ton Deadweight)

Item No.—Item:	Speed of 10½ knots Concrete tanker	Speed of 10½ knots Steel tanker	Speed of 11½ knots Concrete tanker	Speed of 11½ knots Steel tanker
1. I. H. P.	1,980	1,772	2,640	2,416
2. Life of ship in years	20	20	20	20
3. Number of steaming hours during life of ship using 60% efficiency	105,120	105,120	105,120	105,120
4 I. H. P. hours during life of ship	208,137,600	186,272,640	277,516,800	253,969,920
5 Pounds of fuel oil at 1.25 lbs. per I. H. P. hour, used during life of ship	260,172,000	232,840,800	346,896,000	317,462,400
6. Barrels of fuel oil at 314.16 lbs. per bbl. used during life of ship	828,127	741,132	1,104,170	1,010,483
7. Total cost of fuel oil at $2.75 per bbl.	$2,277,349	$2,038,113	$3,036,468	$2,778,828
8. Cost per ton deadweight for constructing ship	$180	$240	$180	$240
9. Total cost of constructing ship (7500 ton deadweight)	$1,350,000	$1,800,000	$1,350,000	$1,800,000
10. Present value of cost of fuel oil considering 5% compound interest	$1,489,494	$1,333,032	$1,985,997	$1,817,487
11. Present value of cost of constructing and propelling ship for 20 years	$2,839,494	$3,133,032	$3,335,997	$3,617,487

Post-War Prices

RELATIVE PRESENT VALUES OF THE COST OF CONSTRUCTING AND PROPELLING CONCRETE AND STEEL SHIPS

(7500 Ton Deadweight)

Item No.—Item:	Speed of 10½ knots Concrete tanker	Speed of 10½ knots Steel tanker	Speed of 11½ knots Concrete tanker	Speed of 11½ knots Steel tanker
1. I. H. P.	1,980	1,772	2,640	2,416
2. Life of ship in years	20	20	20	20
3. Number of steaming hours during life of ship using 60% efficiency	105,120	105,120	105,120	105,120
4. I. H. P. hours during life of ship	208,137,600	186,272,640	277,516,800	253,969,920
5. Pounds of fuel oil at 1.25 lbs. per I. H. P., used during life of ship.	260,172,000	232,840,800	346,896,000	317,462,400
6. Barrels of fuel oil at 314.16 lbs. per bbl., used during life of ship	828,127	741,132	1,104,170	1,010,483
7. Total cost of fuel oil at $1.75 bbl.	$1,449,222	$1,296,981	$1,932,298	$1,768,345
8. Cost per ton deadweight for constructing ship	$75	$100	$75	$100
9. Total cost of constructing ship (7500 ton deadweight)	$562,500	$750,000	$562,500	$750,000
10. Present value of cost of fuel oil considering 5% compound interest	$947,862	$848,290	$1,263,821	$1,156,583
11. Present value of cost of constructing and propelling ship for 20 years.	$1,510,362	$1,598,290	$1,826,321	$1,906,583

Compilation prepared by Emergency Fleet corporation.

Note:—The number of steaming hours in 20 years is an average taken from the transaction of British Society of Naval Architects for 1918.

Builder of Concreter Faith Closes Yard

By Cruse Carriel

CONTRACTS for the construction of five out of eight concrete ships of 7500 tons each at the government shipbuilding plant on San Francisco bay at Oakland, Cal., have been canceled. Two of the remaining vessels were being poured the latter part of February, and upon the completion of the third, the yard will probably close down permanently. The Redwood City yard of the San Francisco Shipbuilding Co., also on San Francisco bay, has been dismantled completely and not even a watchman is employed there. There is no future for the ocean-going concrete steamer built in the United States, according to W. Leslie Comyn, promoter and president of the company which built the stone boat FAITH.

This condition exists, Mr. Comyn says, despite the fact that the Pacific coast is better equipped to construct concrete ships than it is to build steel cargo carriers because of the availability of lumber in that section. Concrete steamers of the ocean-going type can be constructed at less than half the cost of steel vessels, he says, but even with this great differential in construction costs of the two types of carriers, British yards are able to build steel ships at a lower cost per ton that it is possible to erect concreters in this country.

Under these circumstances and based on 20 years of ship operating experience, Mr. Comyn takes a very pessimistic view of the whole project of establishing an American merchant marine. Operating costs are not comparable with those of other nations, he points out, and the costs of the construction of vessels of all types in this country are disproportionate to similar costs in foreign lands which are extensively engaged in building ships.

Subsidy, in Mr. Comyn's opinion, is the only solution of the problem, but he believes that any proposal to allow direct governmental monetary assistance to the ship operators would not be likely to meet with popular approval or support Consequently, he makes the suggestion that the government retain control of its war-built merchant marine and time

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charter the vessels to private operators at such a rate as would permit them tc operate the craft in competition with ocean carriers flying foreign flags. Such an arrangement would, of course, leave a differential in expenses which the government would have to absorb as a loss and in consequence this would be in reality an indirect subsidy which the taxpayers of the country would have to bear. Mr. Comyn thinks, however, that there would be more likelihood of making such an arrangement effective than there would be to institute a system of direct subsidy. Subsidy of some nature is imperative, he claims, if the United States is to enter into competition with other nations for ocean-borne traffic.

This idea of the necessity for a subsidy of some nature is in accord with that of Capt. Robert Dollar, head of the Dollar Steamship Co., but Capt. Dollar advances the proposal that the government should make a direct payment to ship operators through shipping commissioners of the difference between the pay of American seamen and those of other countries engaged on ships in the same trades, but at lower rates of pay.

When I asked Mr. Comyn: "What is the future of the American-built concrete ship?" he replied simply: "There isn't any!", turned on his heel and walked off. But I walked right along with him; hence, this interview.

Holds No Contracts

"The San Francisco Shipbuilding Co. has not a single contract for the construction of a concrete vessel and does not expect to get any," he told me. The whole burden of preparatory overhead and yard-building expense connected with the construction of the FAITH has been assessed against that unique vessels with the result that the total cost of the craft now appearing on the books of the company is in the neighborhood of $850,000. "A full 50 per cent of this amount has been charged off to depreciation as a result of the first year of operation," Mr. Comyn said, "and this was necessary to make the book value of the boat at least approach its actual operating value."

Another element which contributed to the difficulties of the San Francisco Shipbuilding Co. at the offset, which has just come to light, was the attitude taken by some of the members of the United States shipping board in regard to the operation of the vessel, until just recently. The building of the FAITH, it is to be borne in mind, was a gamble, pure and simple. Ten San Franciscans risked $25,000 each at the start on the speculation that a large stone ship could be floated and operated economically. Kenneth MacDonald Jr., and his brother Allen, developed a process of reinforcement and pouring which they thought might mold steel and cement together in the form of a ship. Mr. Comyn was interested and with the two projectors of the plan formed a company which included in its directorate, in addition to these three, John A. Hooper, E. A. Christenson, John Lawson, George Hind and J. H. Baxter. A yard was secured at Redwood City and the company went ahead with the construction of the experimental craft with the tentative understanding that the government was to keep its hands off, so far as the operation of the vessel was concerned, when it was completed. It appeared to be generally accepted in governmental shipbuilding circles at that time that because of the large element of risk in the venture, the company should be relieved of the war-time burden of ship control, if the concreter proved successful, and should be permitted to secure a reward from the open freight market.

At any rate the company went ahead on this assumption, building the boat to its own account and at its own risk, but when it was found that the stone ship was not the fantastical chimera most persons had believed it to be, the government took charge. The company was allowed little, if any, discretion in the routing of the craft and the management was forced to forego an exceedingly remunerative English charter offer.

Later, when the Emergency Fleet corporation undertook to build concreters at the government yard in Oakland, the San Francisco Shipbuilding Co. was given the superintendency contract amounting, as I remember, to some $40,000 per ship to be constructed. There were to be eight of them. The government was to pay all of the costs, and it is paying plenty, according to Mr. Comyn. In addition, the San Francisco Shipbuilding Co. was to receive an outright fee for seeing that the job was done right. The expectation, as I have said, was that eight boats would be built, or "poured," at this plant, but this number has been reduced to three with a resultant loss in superintendency fees.

The views of Mr. Comyn regarding the future of America's merchant marine reflect the viewpoint of the practical ship operator and his position is by no means unique among the shipping men of the Pacific coast.

Elevator B at Port Arthur, Ont., was destroyed by fire recently but there was no loss of grain. The elevator was being torn down to make room for a modern structure. Elevator A was not damaged.

Builds Wooden Tugs for Deep Water Service

The Rocky River Dry Dock Co., Rocky River, O., near Cleveland, is completing five wooden tugboats for service along the Atlantic coast where they will be used by the United States quartermaster's department for such uses as mine laying and for other duty generally performed by vessels of this type. Although the boats were built to government specifications, they are admirably adapted for the duties usually performed by tugboats. They will be taken to the seaboard through the New York barge canal.

These vessels are 101 feet over all, 86 feet 10 inches between perpendiculars, 23 feet 6 inches molded beam, 13 feet 2 inches molded depth at side and are designed to develop a speed of 12 miles an hour.

They are constructed to meet Lloyds' A-1 specifications and have oak frames spaced 24 inches apart. The planking is of yellow pine and oak, 4½ inches thick at the garboards, 3½ inches on the top sides with 4-inch wales. The bilge stringers and clamps are made of 5-inch material.

The vessels are powered with fore-and-aft compound steam engines with cylinders 13 and 26 inches in diameter and 18-inch stroke. The engines turn at a maximum of 130 revolutions per minute and develop 320 indicated horsepower. The propellers are steel castings with 4 blades and are 7 feet in diameter with 9-foot pitch.

Edward H. Vitalius 1876-1919

Edward H. Vitalius died recently at Flint, Mich., following injuries received in an interurban wreck near Oxford, Mich. For many years Mr. Vitalius was a resident of Detroit. He was born in Troy, N. Y., May 30, 1876, and came to Detroit at an early age.

When about 15 years old, he entered the employ of the American Blower Co., Detroit, as a messenger boy in the engineering department. He was advanced rapidly, owing to close application to his duties, and at the time of his death he was chief engineer of the company.

Mr. Vitalius had a wide knowledge of engineering problems pertaining to heating, ventilating and drying and enjoyed a well earned reputation as a designer of equipment for the automatic control of temperature and humidity.

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Wooden Ferris Boat Lost at Sea

First Vessel of This Class to Attempt a Transatlantic Voyage Goes Down in a Heavy Storm in Midocean

By V. G. Iden

UNABLE to weather the terrific storm that swept the Atlantic, the ACCOMA, the first standard wooden ship built for the Emergency Fleet corporation to attempt an overseas voyage, was abandoned in a sinking condition at noon, Feb. 11. Her fate has not stopped plans to demonstrate the ocean-going ability of such ships. Another wooden boat now is scheduled to sail for Baltic ports as a demonstration to aid the shipping board in its vigorous efforts to dispose of the wooden boats. Six of the vessels have been turned over to the recruiting service and will be used to train seamen. The ALABAT, a Ferris-type ship built at Jacksonville, Fla., and put in commission last November, and the STURGEON BAY, a wooden boat built at Sturgeon Bay, Wis., have already been fitted up as training ships.

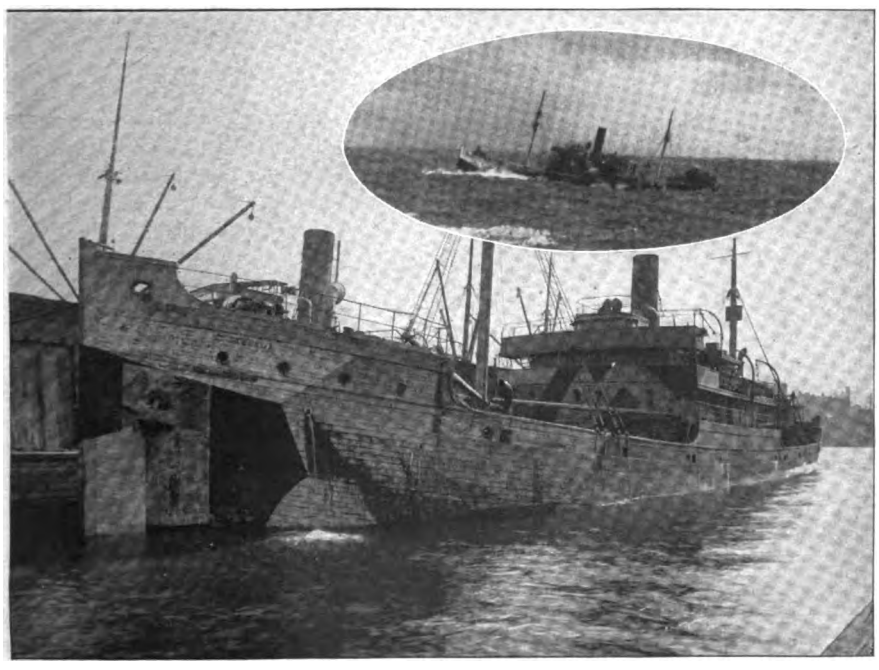
The experience had with the ACCOMA, however, is probably the most interesting in recent maritime history. She was a Ferris-type wooden steamer, built on the Atlantic coast by the Foundation Co. She had completed successfully several trips from Philadelphia to Boston and Portland, Me., with full cargoes of coal before she was assigned to a transatlantic voyage. She sailed from New York Feb. 7 with a miscellaneous cargo of locomotive tires, steel rails, provisions, etc. Captain Phillips, who had been in charge throughout the coastwise service, said that on one of these trips, during ordinary weather, the teeth on the steering engine pinion were stripped and he was obliged to steer the boat by hand from the vicinity of Marthas Vineyard to Portland, Me. At this time he recommended that the steering engine be placed further forward in the midship deck house, and be connected by tiller chains and heavy springs with the rudder quadrant. The steering equipment, as installed, was too rigid, resulting in excessive strain on both the rudder and the engines. This recommendation was carried out.

Examines All Fastenings

Having heard that the fastenings in some of the other wooden boats were insecure, as many as 9000 having been replaced in one of them, Captain Phillips made an examination of the ACCOMA before undertaking the transatlantic voyage and satisfied himself that the fastenings were secure. During the three trips along the coast but little leakage developed. He recommended, however, the installation of a steel rudder and, in fact, steel rudders have been ordered by the Emergency Fleet corporation for all its wooden boats. Owing to the delay in the delivery of this rudder, they installed a new wooden rudder rather than delay the sailing of the ACCOMA at the risk of losing her charter.

The ACCOMA went along in good condition until Feb. 10, when the wind began to freshen. The barometer dropped until it reached 28.50. Captain Phillips had seen the barometer as low as this on only two other occasions. He knew that a violent storm was coming. He capped the ventilators and made everything fast in anticipation of trouble. The gale, which was from the northeast, increased until he found it necessary to head the boat into the wind, although he had intended to keep in a more southerly latitude.

He had oil discharged from the forepeak tanks and was getting along fairly well when at 4:40 p. m., after a short lull, a hurricane of over 100 miles per hour struck the boat. It was not long before a heavy sea was raised but, in the meantime, he had brought his ship about and was running before the wind. The following sea pounded the stern of the ACCOMA so that at times he was afraid it would be carried away. About 8 o'clock, the man at the wheel reported the vessel did not answer her helm and the first mate went aft to investigate.



Steamer ACCOMA, which recently sank in midocean, during a hurricane. Her difficulties were due to a disabled steering gear and to the fact that she made water faster than her pumps could keep her free—The small illustration shows the vessel just before she took her final plunge. She was the first standard wooden vessel built for the Emergency Fleet corporation to attempt a transatlantic voyage

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He found the quadrant jammed hard over, but apparently the rudder stock had either been twisted off or else the rudder itself was gone.

It was not long before the ACCOMA turned into the trough of the sea, shipping much water. Captain Phillips said he did not believe any ship could stand the punishment which the ACCOMA received all that night. The heavy seas crashed on her deck with the roar of surf breaking on a rocky coast. The only dry place on board was in the captain's cabin. None of the crew even attempted to reach their quarters in the forecastle or in the poop. For a while Captain Phillips had the engines reversed in the hope that he could pull the boat out of the trough of the sea, but finding that this was ineffectual, he finally had the engines shut down.

Trouble then developed below decks. This was described afterward by the chief engineer. "About 8:30, after the captain had reported the disabling of the rudder," stated the report of A. C. Kick, chief engineer, "and after the engines had been stopped, the engineer on watch supplemented the two bilge pumps which were not able to hold their own with the condenser circulating pump. He said that this pump had only a small suction pipe and was not able to work up to full capacity. Nevertheless, all three pumps were discharging a large volume of water.

Vessel Listed to Port

"Earlier in the afternoon, it was discovered that the starboard fresh water tank in the after-hold was empty. Some repairs were made on this tank before the vessel sailed, and the engineer believes that a plug must have been left out. The loss of this weight gave the ACCOMA a list to port. This was increased by a leak which admitted water to the port 'tween deck coal bunker, the water saturating the coal and leaking into the boiler room around one of the hold-beams.

"One of the mates told the engineer that there was a half round scupper opening outboard from the coal bunkers, and he thinks it is possible that owing to the list and the rolling in the trough of the sea, the water was admitted by this scupper. The engineer thought that no opening should have been made outboard from the coal bunker, and he commented on the fact that similar scuppers opened outboard from the forecastle instead of on to the forward well deck.

"As the list of the ACCOMA increased, the water on the port side became so deep in the boiler room that it was impossible to keep the fires going under the port boiler. They had great difficulty in firing the starboard boiler, because as fast as they would pile up some coal on the plate floor, it would be washed away by the rush of water as the vessel rolled. Nevertheless, the stokers, who were Greeks, kept the starboard boiler fired up until about midnight. The water had then risen so high that they were forced to leave the stokehold.

"Meanwhile the engineer had shut off the circulating pump so as to prevent sea-water from running back through it into the hold after it had stopped. The two bilge pumps and the dynamo engine ran slower and slower, until about 1 o'clock in the morning, when the boiler was no longer delivering steam."

Captain Phillips sent out wireless calls for help and received replies from a Spanish steamer, the J. D. ARCHIBALD and the DONGARRA. The captain, his wife and the crew were taken from the ACCOMA the next morning by the rescuing vessels. After the first boat had been launched the ACCOMA took a heavy list to port due, undoubtedly, to the collection of water in the port coal bunkers. This rendered the starboard lifeboat useless, but made it easier for them to launch the port boat. The DONGARRA was not able to send any assistance because she was riding high in the water and rolling too violently to permit the launching of a lifeboat. The first boat load succeeded in getting aboard the DONGARRA, which then furnished a crew to take the life boat back to the ACCOMA. At about noon, the 22 men remaining on the ACCOMA were taken off and the vessel was abandoned.

Captain Phillips thought that the principal leak might have been due to the damaging of the ash ejector, which was in the port coal bunker above the water line. The ACCOMA had left New York with her winter North Atlantic mark about 4 inches above the water line. In the trough of the sea, however, the ash ejector was frequently submerged. The chief engineer said that the only place he could see water coming in was where it leaked through from the coal bunker. He thought that as the vessel rolled in the trough of the sea, she gradually opened up her seams so that water was leaking into all the holds.

Engines Not at Fault

The engineer expressed a doubt whether the ship would have been able to weather the storm even though she had not lost her rudder. He said that although he had never sailed on a large wooden vessel before, he had often talked to the skippers of the sailing vessels, who said that in heavy storms it was necessary to keep the pumps going all the time. "If sailing vessels opened up in this way, it was natural that a steamer with her engines amidships, under much heavier strain, would be loosened up even more rapidly," he said.

The engineer mentioned the fact that the engine was well balanced, and so firmly secured that when he was in his cabin directly over the engine room, he could not tell whether the engine was running unless he opened the door. There was no appreciable vibration. He had no complaint to make about the operation of the engines or boilers, and in fact said that he did not think any wooden vessel even though it had been built of hard seasoned wood, and from the best design, could have weathered the storm which overtook the ACCOMA.

The ACCOMA was in 37 degrees north latitude and 62 degrees, 30 minutes west longitude when she met with her fate. When last seen by the crew, she was sinking gradually by the stern, her afterwell deck awash. She had a heavy list to port, and the captain was of the opinion that she was gone before dark. The ocean in that vicinity is about three miles deep.

Considered an Able Vessel

The ACCOMA was built at the Passaic river yard of the Foundation Co. She was launched on April 27, 1918, and placed in commission by Messrs. Smith & Terry in September. Among shipping men she was considered one of the best built of the wooden fleet, and it was for this reason she was assigned to the first transatlantic voyage attempted by any of these steamers.

In its Pacific coast yards, the Foundation Co. built last year 40 wooden vessels of a different design for the French, all of which are now in commission. Of these 40 vessels built for the French, not one has had trouble with its hull and all are now in commission on the Atlantic and the Pacific. Of the total built for the French, two vessels have reached La Pallice successfully, one has gone to Casa Blanca, Morocco, four are on the ocean voyaging to France, four are on the west coast of South America, five are on the east coast of South America, five are at Panama, one at Colon, five are in the Gulf of Mexico and the remainder are at various ports of the United States.

The Institution of Naval Architects of England will hold its annual meeting on April 9, 10 and 11 at London. The president of the institution is the Earl of Durham.

The law firm of Hoyt, Dustin, Kelley, McKeehan & Andrews, Cleveland, has been dissolved. Hermon A. Kelley and George William Cottrell have taken over the admiralty business of the old firm and plan to continue the general practice of law under the firm name of Kelley & Cottrell with offices on the fifteenth floor of the Rockefeller building.

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Conveying Equipment Makers Organize

Manufacturers of metal handling machinery have formed an association and will give particular attention to port and terminal problems.

The general lines of work will parallel those of other trade associations, but it is said that the nature of the problems involved will require more extensive technical committee work than is customary in such bodies.

The active conduct of the association's work will be in the hands of Zenas W. Carter, secretary and manager. The officers of the association are: President, Calvin Tomkins, formerly commissioner of docks, New York City; vice president, J. A. Shepard; treasurer, Lucian C. Brown; directors, Mr. Shepard, Mr. Brown, R. W. Scott, F. W. Hall, William Clark, J. C. Walter, C. M. Watson and Fred Stadelman. Four additional directors are to be chosen when the membership is completed. Members are:

Watson Elevator Co., Edward F. Terry Mfg. Co., International Conveyor Corp., Rownson, Drew & Clydesdale, Inc., New Jersey Foundry & Machine Co., Hayward Co., Elwell-Parker Electric Co., Sprague Electric Works, Otis Elevator Co., Manning, Maxwell & Moore, Inc., Robins Conveying Belt Co., Michener Stowage Co., all of New York; Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.; Brown Portable Conveying Machinery Co., Chicago; Karry-Lode Industrial Truck Co., Long Island City, N. Y.; Whiting Foundry Equipment Co., Harvey, Ill.; Wellman-Seaver-Morgan Co., Cleveland; Alliance Machine Co., Alliance, O.; Alfred Box & Co., Inc., Philadelphia; Mead-Morrison Mfg. Co., East Boston, Mass.; Alvey-Ferguson Co., Cincinnati; Heyl & Patterson, Inc., Pittsburgh; American Hoist & Derrick Co., St. Paul; Cleveland Crane & Engineering Co., Wickliffe, O.; Clyde Iron Works, Duluth; Ohio Locomotive Crane Co., Bucyrus, O.; Northern Engineering Co., Detroit; Electric Controller & Mfg. Co., Cleveland.

Offices have been opened at 35 West Thirty-ninth street, New York.

An Analysis of Operating Economies

OWNERS of vessels operated on oil fuel have shown considerable interest in the report that oil has been discovered in England. They hope that this will hasten the return to normal oil prices, inasmuch as during the war the cost of oil for these ships has advanced at a much greater rate than the cost of any other fuel. The cheaper oil today is purchased in the United States, where the price is from $2.75 to $3 a barrel. At Hull, England, however, oil is reported to be selling at $5 a barrel. The cost of coal at Atlantic ports is $7.50 a ton whereas coal is much more expensive in Europe. Today the American ship operators appear to have the advantage over foreigners insofar as the price of fuel is concerned.

The cost of oil for ships, nevertheless, is today more than the cost of coal. But even though it is costing more for fuel to operate an oil-burning ship a mile, many American ship operators insist there is economy in burning oil. The figures presented by one experienced ship operator show that a 12,000 deadweight-ton boat with a reciprocating engine and oil-fired boilers, speeding at the rate of 10 knots, will consume one barrel of oil a mile. For the same speed and the same distance a ship will consume four barrels of oil to one ton of coal. Figuring the cost of bunkering coal at 60 cents per ton, there being no similar cost against oil, it will cost $8.10 to fuel a coal-burning ship against a unit cost of $11 for the oil-burner.

Operating at a speed of 10 knots there is an excess of approximately $2.90 in oil fuel cost every four miles. Even though this makes it appear that the oil-burning ship costs more to propel, some ship operators insist that the oil-burner is the more economical owing to the crew in the engineroom being smaller, to a greater efficiency in the boilers, to a smaller up-keep cost in an oil-burner, and to a considerable saving in bunker space. With the prospective reduction in the cost of oil it is anticipated that a much greater economy will result.

Since the signing of the armistice ship operators have been giving considerable study to the economy of operation and they have about concluded that the extra fast ship is not desirable. The faith of many in oil fuel, however, has remained unshaken, and they are inclined to believe that with the use of the diesel engine still greater economy will be effected. The diesel engine is said to be a low fuel consumer. With the ordinary oil-burner or the coal-burning engine the economical speed is declared to be around 10 knots an hour. Speedy cargo boats were especially desirable during the war not only because they could race through the submarine zone and quickly escape danger, but because during the war charter rates were high and the quicker a ship could be made to complete a voyage the more rapidly would the freights accrue. A body of English shipping experts, it has been pointed out, have reported after a careful survey that the 10-knot engines are the most economical.

For special trades, a faster boat may prove more advantageous. The boats of the United Fruit Co., for instance, which are refrigerator boats bringing fruits from the tropical regions, should run fast in order to protect their perishable cargoes. These boats make from 15 to 16 knots. But for the sugar trade and other general lines the 10-knot boats have been decreed the most economical. This has been shown in some practical demonstrations. For instance, a boat of medium size burning coal consumed approximately 50 tons of coal on a certain voyage when she was speeded not in excess of 10½ knots. When it was attempted to speed this same boat to 14 knots over the same voyage, she burned 100 tons of coal to make the distance. In this instance the boat burned 100 per cent more coal when her speed was increased about 3½ knots per hour. An oil burner increasing her speed from 10 knots to 15 knots will consume an approximately like increased amount of fuel, but the ratio of this increase is said to be not as great as for coal.

The ratio in the increase in fuel consumption for greater speeds entirely offsets the saving in wages and boat hire for the time saved on the voyage. Ship operators therefore have no intention of experimenting with speeds in excess of 10 knots unless the diesel engine is developed, or some similar low fuel consumption engine is designed, which can be made of practical use in the larger cargo vessels. While the text of the report made to the shipping board by the committee of experts on peace-time ship design has not yet been made public, it is understood that some of these cost factors will be included for the benefit of the board.

As is generally known the report will advise the disposal of many of the smaller cargo boats built during the war as being vessels which cannot be economically operated under the American flag during peace times.

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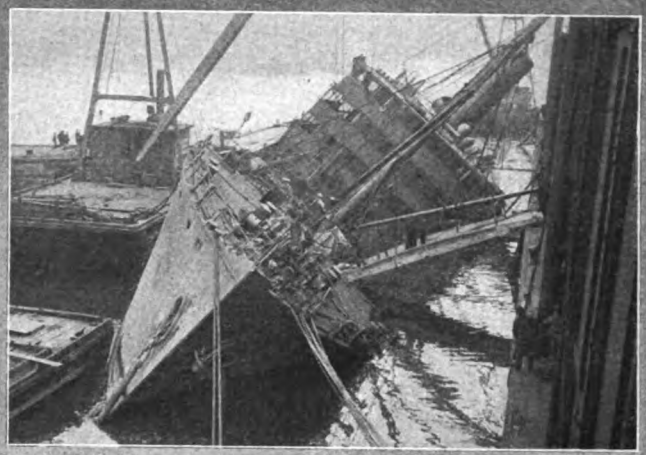
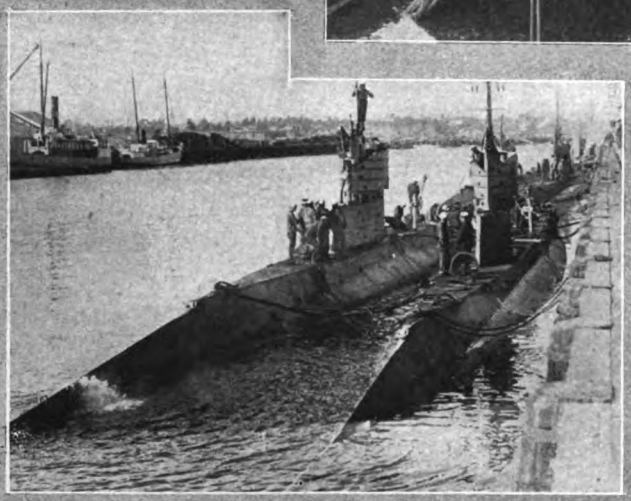
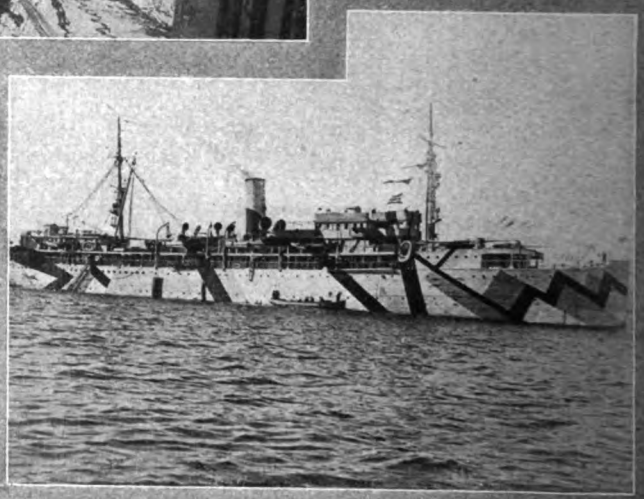
Latest Marine News in Pictures

LOS ANGELES harbor was chosen by the navy department as the site for the largest submarine base on the Pacific coast. Below are some of the submarines berthed at this harbor and their mothership.

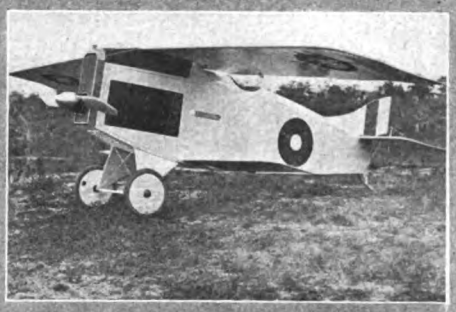


WHEN the U. S. naval transport Sixaola, loaded with supplies for France, caught fire recently at Hoboken, N. J., it was decided to sink her. Two officers lost their lives opening seacocks.





THE censor has just released this exceptional war-time photograph, showing the sinking of the United States steamship Covington.



GULF QUEEN was christened on Feb. 27 at the yards of the New York Shipbuilding Corp. Opposite is the craft entering the water.

AVIATORS who have learned the gentle art of bombing will drop mailsacks on the decks of the liners operated by the Kerr Steamship Co., from 24 to 36 hours after the ships have left port, if the company's plans materialize. Here is the first machine constructed for the service, a strutless biplane, equipped with a 6-cylinder motor.

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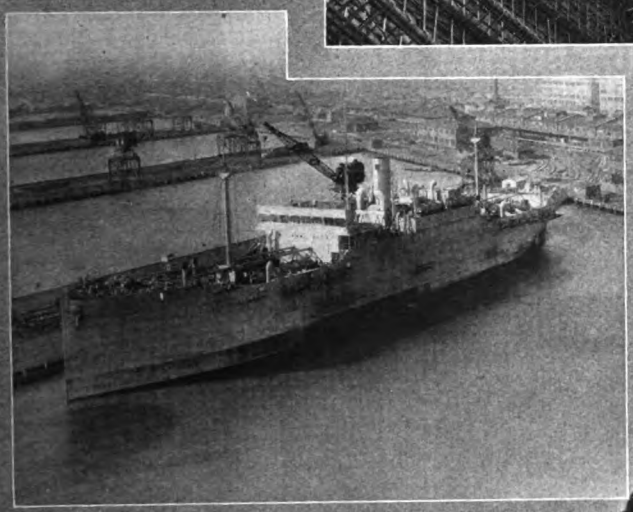
Photographs From Far and Near

THE Hog Island shipyard continues to grow and become a busier, more important institution day by day. Here is one of the latest views of the yard, showing Hull 493 being outfitted.

THE steel framework of a concrete ship resembles a gigantic cage with busy workmen proportionately smaller than so many canaries in their narrow confines. Specifically, this is Hull 1663.

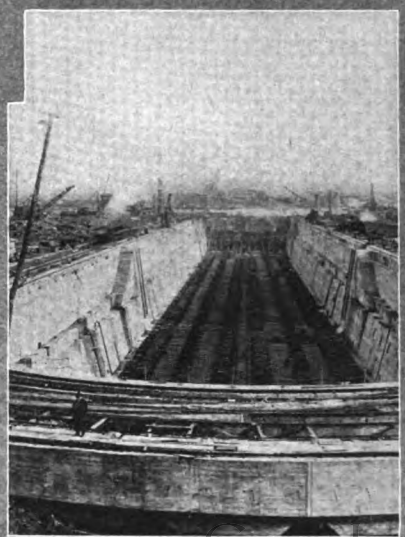


THE bulk oil steamer "Gulf Queen," built for the Gulf Refining Co., of Pittsburgh, has a capacity of 63,000 42-gallon barrels.

SOLDIERS and sailors back from France are being taught how to rivet and build ships at Hog island. They make good workmen.

MC. BRUSH, the new president of the American International Shipbuilding Corp., is 40 years old and "boss" of the world's largest shipyard, Hog island.

At the right is shown the largest concrete drydock in the world, 1000 feet long, recently launched at the Norfolk navy yard.



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Photos © Int. Film Service

Agree on Vessel Operating Plan

Shipping Board and Vessel Operators Come to a Definite Understanding and Adopt Rider to Previous Operating Agreement

At the February meeting of the American Steamship association, the ship operators approved a rider to the government's operating agreement providing for a freight and charter brokerage fee of 1¼ per cent. This rider will be attached to all the agreements with the stipulation that it will be allowed "in all cases where they have been necessarily or properly incurred to secure cargoes and charters and have been paid in accordance with the usages of the trade. No brokerage will be allowed on cargoes allocated by the shipping board direct, or through any of its agencies."

This rider had been accepted by the shipping board and was the result of a conference with a committee of the American Steamship association headed by F. D. Mooney, president of the New York & Porto Rico Steamship Co. A new form of operating and managing agreement will be prepared by the shipping board embodying this rider and other verbal modifications which will be issued to the steamship operators at an early date.

The association, at this same meeting, also decided to communicate with all members and ascertain what fees and commissions they are paying to their representatives in foreign ports, as shown by their vouchers, so that it can furnish a certificate to the shipping board to be issued to their auditors and the proper vouchers may be passed. Mr. Mooney was named chairman of the committee to supervise the preparation of this certification of fees and commissions, and to conduct all future negotiations with the shipping board in regard to these agreements. Other members appointed on the committee to serve with Mr. Mooney are Oakley Wood, vice president of the Barber Steamship Co.; W. H. Randall, president of the Shawmut Steamship Co., and A. J. McCarthy, manager of the operating department of the International Mercantile Marine Co.

A telegram was sent to the shipping board by the association reading as follows:

"At meeting held today, after hearing the report of the committee and of counsel, the members of the American Steamship association unanimously resolved to accept the former operating and managing agreements with the rider attached to the operating agreement as embodied in resolution of shipping board, and to accept the new operating and management agreements as revised by Mr. Kirlin and Mr. Campbell. All members not represented at meeting will be advised of this action by mail."

Mr. Wood was named chairman of a committee to confer with the comptroller of the shipping board and his associates upon matters pertaining to auditing. The members designated to serve on this committee with Mr. Wood are M. W. Tingley, R. C. McBain, Charles Barthold, and E. H. Hall.

The members of the association in attendance at this meeting were Hugh Gallagher, general eastern agent of the Admiral line; J. D. Tomlinson, operating manager of the American-Hawaiian Steamship Co.; H. G. Perrine, treasurer of the American Transportation Co.; W. G. Bates of the Atlantic & Pacific Steamship Co.; E. J. Barber, president, and Oakley Wood, vice president, of the Barber Steamship Co.; E. M. Bull, vice president of the A. H. Bull Steamship Co.; H. H. Raymond, president of the Clyde Steamship Co.; G. W. Sterling, vice president of the Eastern Steamship lines; J. B. Austin, vice president of the Globe line; J. L. Gillingham, counsel for the Gulf Refining Co.; A. J. McCarthy, manager of the operating department of the International Mercantile Marine Co.; H. H. Raymond, president of the Mallory Steamship Co.; E. J. McCormack, vice president of the Moore & McCormack Steamship Co.; A. H. Bromell, vice president of the Munson Steamship line; J. Howland Gardner, vice president of the New England Steamship Co.; W. D. Macy, vice president of the New York & Cuba Mail Steamship Co.; F. D. Mooney, president of the New York & Porto Rico Steamship Co.; R. A. Nicol, vice president, and J. Sampson, vice president, of the Oriental Navigation Co.; J. H. Dewson, assistant manager of navigation of the Pocahontas Fuel & Transportation Co.; E. G. Warfield, vice president of the Seaboard & Gulf Steamship Co.; W. H. Randall, president of the Shawmut Steamship Co.; R. F. Hand of the Standard Oil Co. of New Jersey; James Donald, general manager, and J. Scott, assistant general manager, of the States Marine & Commercial Co.; W. M. Lowrie, passenger traffic manager, J. J. Kelleher, freight traffic manager, and R. J. Plummer, assistant manager of the marine department of the United Fruit Co.; L. Pfeiff, freight agent of the United States Steel Products Co.; Charles Skentelbery, general manager of the Warren Transportation Co., and J. P. Kirlin, counsel for the association. The original operating and managing agreements were published in THE MARINE REVIEW for February, 1918. The rider is shown in the accompanying box.

The Rider

THE operating agreement to which this rider is attached shall be and is modified and supplemented as follows:

1.—The commissions and fees payable to the agent under the attached agreement shall be in accordance with Schedule A set forth on page 2 of agreement and shall cover all vessels heretofore or hereafter assigned to the agent, until a new operating agreement covering future operations shall be executed by the parties to the agreement.

2.—Freight and charter brokerages paid in United States ports shall be allowed as heretofore paid by the operators up to 1¼ per cent in all cases where they have been necessarily or properly incurred to secure cargoes and charters and have been paid in accordance with the usages of the trade. No brokerage will be allowed on cargoes allocated by the shipping board direct, or through any of its agencies.

3.—The commissions and fees to be allowed under the attached agreement for brokerage and agency services in foreign and dependency ports shall be in accordance with the usual commission and fees paid in the respective ports, as certified to the board by the American Steamship association, and verified by the comptroller.

4.—The comptroller shall cause the accounts of the operators to be audited in the offices of the latter and shall approve such accounts providing the same are supported by customary and proper vouchers.

On account of a freight handlers' strike in Boston several steamships last month were diverted to other ports. The trouble was adjusted on a compromise basis.

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Death of H. R. Mallory

Henry R. Mallory died on March 4 at Winter Park, Fla., of heart failure following a long illness. Mr. Mallory was one of the most prominent men in the coastwise shipping business and was the second son of the late Charles Mallory and grandson of Charles Henry Mallory who founded the line of steamships bearing his name.

The name of Mallory has been linked with American shipping activities for nearly three-quarters of a century. In 1837 Charles Henry Mallory built the first American clipper at Mystic, Conn., and entered the shipping trade, sailing as far east as China. His business ability and farsightedness led to the rapid expansion of the business and in 1866 he founded the firm of C. H. Mallory & Co. The main line of the company ran between New York and Galveston, Tex.

Upon the death of his father, Henry R. Mallory became president of the company. When the line was sold to Charles W. Morse, and was consolidated with other coastwise lines, Mr. Mallory practically retired from active business. When the Morse pool failed, however, the security holders induced Mr. Mallory to return to active management of the company's involved affairs and to accept the presidency of the present Atlantic, Gulf & West Indies Steamship Co.

Under Mr. Mallory's able management the affairs of the subsidiary organizations, which were merged with the Mallory line, were successfully handled. These included the Clyde line, the Ward line and the Porto Rico line. Ill health compelled Mr. Mallory again to retire from active business in 1915.

He was a director of the Clyde Steamship Co., the Eastern Steamship Corp., the Mechanics and Metals National bank, the New York & Cuba Mail Steamship Co., the New York & Porto Rico Steamship Co., of Maine, the North American Co. and the San Antonio Co.

Mr. Mallory was in his seventy-first year. He is survived by his wife, who was Miss Cora Pynchon; two sons, Clifford B. Mallory and Phillip Rogers Mallory and one daughter, Mrs. Frank B. Munson.

Launch First Ship

The Virginia Shipbuilding Corp.'s first steel ship, GUNSTON HALL, slipped quietly from the ways in the yard at Alexandria, Va., into the historic Potomac river promptly at 4 o'clock on the afternoon of Feb. 27, with much of her machinery and equipment installed. Mrs. B. W. Morse, wife of the vice president and general manager of the company, formally christened the vessel which had been named by Mrs. Woodrow Wilson on May 30, 1918, when President Wilson drove the first rivet into the keel. The GUNSTON HALL is the largest steel ship ever built on the Potomac, being of 9400 deadweight tons. She is of the Isherwood design, 417 feet 3 inches in length, 53 feet beam and 26 feet 6 inches deep. Her speed will be 10½ knots loaded. She is one of 12 vessels ordered from the company.

American Shipping Makes Big Gains

According to a statement just issued by the United States shipping board, the American merchant marine comprises 46 per cent of all shipping plying between American and foreign ports. On Jan. 31 the following ships were in overseas service under the American flag:

Employment	No. of vessels	Gross tons
TRANSATLANTIC		
West African	13	14,034
South African	24	33,793
East African	1	3,350
British	13	58,685
French	23	89,462
Belgian relief	4	23,213
Italian	25	119,587
Swiss	1	1,965
Spanish	3	7,271
Portuguese	7	23,142
Other Mediterranean	9	16,974
Northern neutrals	2	12,606
Other transatlantic	1	2,246
TRANSPACIFIC		
East Asian	49	162,304
East Indian	5	13,279
British Indian	3	12,502
Australian	71	83,423
Hawaiian	17	43,416
SOUTH AMERICAN		
Amazonian	27	22,830
Central Brazilian	44	87,385
River Plate	39	99,488
West Coast	70	193,018
CARIBBEAN AND MEXICAN		
West Indies	168	400,055
Caribbean	63	147,419
Mexican Pacific	2	2,262
Mexican Gulf	42	211,516
ALASKAN	14	30,891
CANADIAN		
Pacific	9	20,860
Atlantic	3	24,263
Overseas total	752	1,961,239

This fleet includes 351 freighters, 84 freight and passenger ships, 3 freight and refrigerator vessels, 7 freight, passenger and refrigerator ships, 6 colliers, 71 steam tankers and 230 sailing vessels.

Recommend Four Types of Cargo Vessels

FROM information credited to J. H. Rosseter, director of operations of the Emergency Fleet corporation, the government has formulated definite plans regarding the type of ships it will construct in the future. The vessels are divided into four groups as follows:

Group 1.—A 3-deck, shelter deck, single screw steel freight steamer, 420 feet over all; 405 feet between perpendiculars; molded beam, 56 feet; molded depth to shelter deck, 36 feet 9 inches, with a carrying capacity of 10,000 tons deadweight, with a draft of 26 feet, installed with quadruple expansion engines of approximately 4000 horsepower, and three Scotch boilers, being oil burners, with steaming radius of 13,500 knots without bunkering.

This type of vessel is well known on the Pacific coast, having been operated by Grace & Co. It is known as the Santa type and has given good service.

Group 2.—A 3-deck, shelter deck, single screw freight steamer, 490 feet over all; 470 feet between perpendiculars; molded beam, 62 feet; molded depth to shelter deck, 43 feet, with carrying capacity of 12,500 tons deadweight, with a draft of 29 feet 2 inches, installed with quadruple expansion engines of approximately 5600 horsepower and five Scotch boilers, oil burning, with a steaming radius of 14,000 knots without bunkering.

Group 3.—A 3-deck, shelter deck, steel freight steamer, 522 feet over all; 500 feet between perpendiculars; molded beam, 68 feet; molded depth to shelter deck, 45 feet 6 inches, with carrying capacity of 15,000 tons deadweight, with draft of 30 feet 8 inches.

These vessels will be either installed with twin screw quadruple expansion engines of approximately 6600 total horsepower or single screw quadruple expansion engines of approximately 6600 horsepower and six Scotch boilers, oil burners, with a steaming radius of 14,000 knots without bunkering.

Group 4.—A 3-deck, shelter deck, twin screw motor freight vessel, 440 feet over all; 425 feet between perpendiculars; molded beam, 56 feet; molded depth, 38 feet to shelter deck, with carrying capacity of 9800 tons deadweight, with draft of 26 feet, installed with twin screw, 6-cylinder, 4-cycle diesel type engines, running at 100 revolutions per minute and developing a total of 4000 brake horsepower. Steaming radius, 28,500 knots, without bunkering.

All the foregoing types are designed with sea speed of 13 knots.

All boilers in the steamers to be same type and size, as follows: 15 feet 6 inches inside diameter x 12 feet, built for 220 pounds working pressure and fitted with forced draft and superheaters.

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Marine News in a Personal Way

Intimate Gossip About What Leaders in the Maritime World Are Doing

G W. BURRELL was elected second vice president of the Wellman-Seaver-Morgan Co., Cleveland, at its recent annual meeting. Mr. Burrell has been in the continuous employ of the company for 21 years. In his new position he will have entire charge of the company's Cleveland and Akron, O., plants. Mr. Burrell was born in 1871 and left school at the age of 14 to learn the machinist's trade. He worked in machine shops for five years, during which time he studied nights in preparation for college. In 1891, at the

G. W. BURRELL

age of 20, he entered the Ohio State university where he took a three years' course in mechanical engineering.

He entered the employ of the Wellman-Seaver-Morgan Co. in 1898 where he has successively held the following positions: Draftsman, 3 years; inspector, 6 months; chief inspector, 6 months; assistant purchasing agent, 6 months; assistant secretary, 6 months; assistant works manager, 14 years, and manager of works, since May, 1917, leaving this post to take up his new duties.

At the annual meeting of the company the following other officers were elected: EDWIN S. CHURCH, president and general manager; S. H. PITKIN, vice president, and W. H. COWELL, secretary and treasurer. At this meeting the retiring board of directors was re-elected. The directors are EDWIN S. CHURCH, F. E. BORTON, W. H. COWELL, F. B. RICHARDS, S. T. WELLMAN, E. H. WHITLOCK, all of Cleveland; S. H. PITKIN, FRANCIS SEIBERLING and F. A. SEIBERLING, all of Akron, O.

* * *

A. S. BLAGDEN was elected president of the Air Reduction Sales Co., New York, at the recent organization meeting of the directors. Other officers elected at the same time include A. R. LUDLOW, vice president; C. E. ADAMS, treasurer; M. W. RANDALL, secretary; C. L. SNOW, assistant treasurer, and C. C. EMERSON, assistant secretary.

* * *

DUDLEY R. KENNEDY has opened offices as counsel and practical advisor in labor employment and industrial relations problems in the Real Estate Trust building, Philadelphia. Mr. Kennedy was previously connected with the American International Shipbuilding Corp., Hog Island, Pa., as manager of industrial relations.

* * *

J. F. MACKIN, Columbus, O., has recently become associated with the Black & Decker Mfg. Co., Baltimore, as representative for the state of Ohio. He has been connected with the portable electric drill industry for some years, being formerly associated with the Independent Pneumatic Tool Co., Chicago.

* * *

HARRY K. BARR, of the Barr Shipping Co., recently opened offices at 260 California street, San Francisco and in the Drexel building, Philadelphia. The San Francisco office is under the name of Harry K. Barr of the Barr Shipping Co. The Philadelphia office is handled under the name of Barr & Caldwell, Inc., with HARRY K. BARR as president, CLARK M. CALDWELL as vice president, and ROBERT R. BARR as secretary and treasurer.

* * *

MAJ. GEN. WILLIAM MURRAY BLACK, corps of engineers, U. S. A., has been appointed chairman of the port and harbor facilities commission of the United States shipping board. He succeeds EDWARD F. CARRY, Chicago, who recently resigned. General Black will continue to perform his military duties in addition to those falling to him in his new position. General Black is a graduate of West Point and is thoroughly conversant with engineering problems.

* * *

JOHN J. SHARP and C. C. RODRIGUEZ recently resigned from the Emergency Fleet corporation. Mr. Sharp was manager of European trades while Mr. Rodriguez managed South American trades. Mr. Sharp will return to the Kerr Steamship Co., New York.

* * *

HARRY B. HILLS has taken charge of

A. S. BLAGDEN

the technical department of the Steward Davit & Equipment Corp., New York.

* * *

W. H. A. WALKER, who is tank steamer executive for the United States shipping board, now has charge of the board's chartering committee. Mr. Walker is officially recognized as chartering executive.

* * *

WILLIAM G. COXE, former president of the Harlan & Hollingsworth Corp., Wilmington, Del., and later director of privately owned shipyards along the Delaware river for the Emergency Fleet corporation, has become associated with the Pusey & Jones Co.'s shipyards in Wilmington, Del., and Gloucester City, N. J.

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Marine News in a Personal Way

Intimate Gossip About What Leaders in the Maritime World Are Doing

M. J. WRIGHT has been appointed general agent for the Admiral line in the Philippine islands with headquarters at Manila. Mr. Wright has a record of many years of efficient service in the steamship business. He started his career in 1901 at Vancouver as ticket agent for the Stimson Wharf Co. In 1905 he entered the employ of the Pacific Coast Steamship Co., where he rose steadily until he became contracting freight agent of the company in Seattle. With the consolidation of the Pacific Coast Steamship Co.

M. J. WRIGHT

and the Pacific Alaska Navigation Co., Mr. Wright became chief clerk to the freight traffic manager of the consolidated companies, with offices at San Francisco. In January, 1918, he was appointed assistant general freight agent of the Pacific Steamship Co., with headquarters in Seattle, which position he held until his recent appointment to Manila.

* * *

HENRY S. QUICK has severed his connection with the Kerr Steamship Co., Inc., New York. He was general freight agent for the company since its entrance into ocean transportation about four years ago.

* * *

LANDON B. SMITH was recently appointed port agent at New Orleans for the foreign commerce service of the United States railroad administration. Mr. Smith's offices are in the Queen & Crescent building. He fills the position recently held by MELVIN P. BILLUPS, resigned, who is now assistant director of operations at New Orleans for the United States shipping board.

* * *

W. F. TAYLOR, who is assistant to J. H. Rosseter, director of operations for the United States shipping board, has been appointed assistant director to handle the increasing work pertaining to the direction of operation of American merchant vessels. Mr. Taylor is well versed in Pacific coast shipping problems and was connected with Southern Pacific railroad and other roads in the western part of the country for more than 18 years. A large part of his present duties consists in the actual direction of vessels released from war service.

* * *

F. A. STANLEY has been appointed freight traffic manager for the Great Lakes Transit Corp., Cleveland. Mr. Stanley now has charge of all freight traffic as the position of general freight agent has been abolished.

* * *

THEODORE R. HERMANSON has become works manager of the Epping-Carpenter Pump Co., Pittsburgh. Mr. Hermanson was formerly connected with the Worthington Machinery Corp. at its Harrison works.

* * *

LIEUT. E. W. STETSON, member of the United States auxiliary force left Seattle recently for San Francisco to await orders for sea duty. Lieutenant Stetson is well known on the west coast and holds master's licenses for inland waters and ocean service. He was formerly a division officer of the U. S. S. VICKSBURG and was one of the first executive officers at the naval training station in Seattle.

* * *

CHARLES A. ASTLEY who served in the United States navy during the war has left the service to take up his former position as marine and grain clerk of the Merchants' exchange of Seattle.

* * *

CHARLES D. DYER JR., superintendent of service of the American International Corp., Hog island, Philadelphia, and who since his graduation from the University of Pennsylvania in 1908, previously had directed the industrial relations organization of the Republic Iron & Steel Co. and the Semet-Solvay Co., has become a member of Hunt & Dyer, recently organized with headquarters in the Commercial building, Philadelphia. The new firm will develop industrial life insurance.

* * *

H. E. GILPIN was re-elected president of the Great Lakes Towing Co. at its recent annual meeting. Other officers elected are: THOMAS JOHNSON, vice president; M. H. WARDWELL, secretary and

LIEUT. JOHN H. CLARK

treasurer; G. H. VROMAN, assistant secretary, while H. A. KELLY and HARVEY D. GOULDER were re-elected general counsel.

* * *

LIEUT. JOHN H. CLARK, who has been in charge of the United States naval auxiliary reserve recruiting office at Cleveland, and who is well known to lake men, was placed on the inactive list on Feb. 22. Lieutenant Clark has been appointed district manager of the Great Lakes, including Canada, for the Sperry Gyroscope Co., Brooklyn, N. Y. He is making Cleveland his headquarters, with offices in the Guardian building.

* * *

CHARLES KAUFMAN, connected with the immigration department of the Cunard line, at Boston, has successfully passed examination for the Massachusetts bar.

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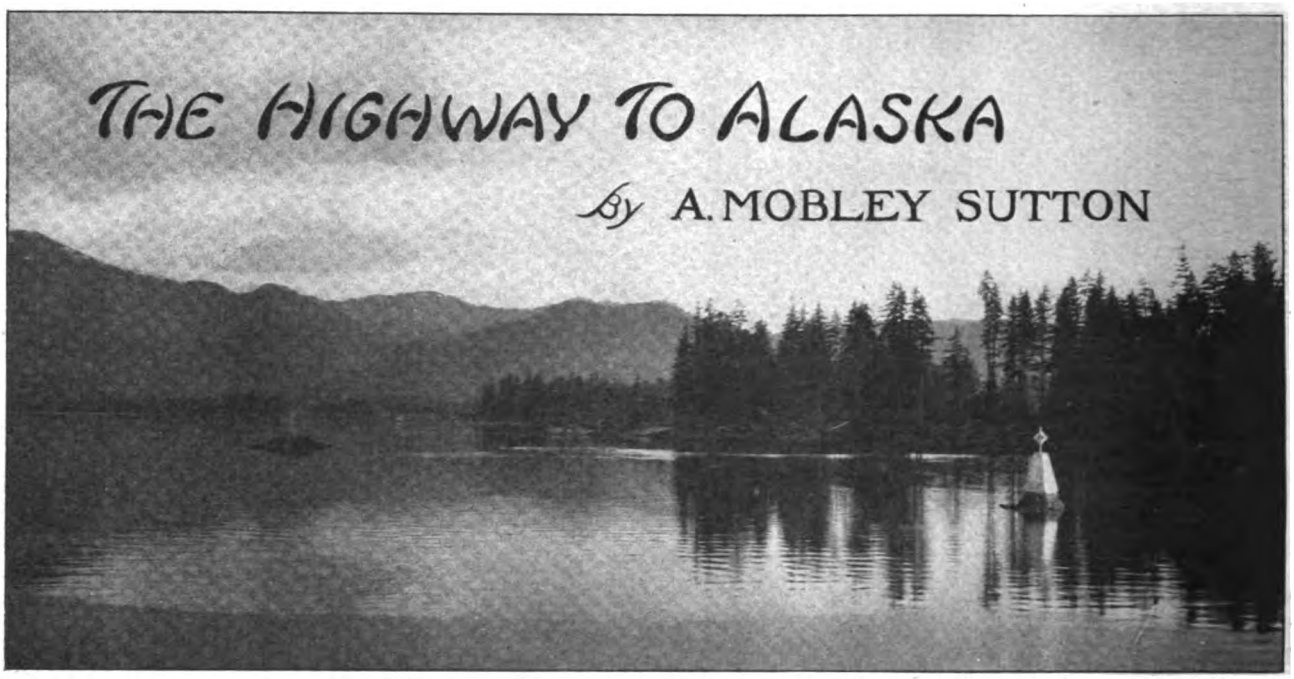
THE HIGHWAY TO ALASKA

By A. MOBLEY SUTTON



Where the Mountains Meet the Sea—Tongass Narrows on the Highway to Alaska—These Placid Waters Hide Numberless Pinnacle Rocks

THE highway to Alaska is not a broad thoroughfare according to the usual idea conveyed by the term. It is, instead, a series of narrow winding sea lanes, which like many country lanes hold the lure of the unexpected and beautiful at each turn. Like most other lanes, however, they have their disadvantages not usually found on the broad highway; for when the night comes on and the wind blows or a screen of fog or snow descends, the traveler must feel his way along and there are also pitfalls for the vehicle traversing them even in clear, calm weather. Instead of the loose rocks and the mud holes of the country, the characteristic pitfall of the sea lanes of Alaska are the submerged pinnacle rocks. These spire-like formations rise from the floor of the sea to various heights, sometimes within a few feet of the surface of the water, lurking there out of sight ready to tear a hole in the hull of the first ship attempting to pass over them.

These do not rise to dangerous heights during the first part of the trip, however. From Seattle to half way up the coast of Vancouver island, the channel is too deep and wide for the mariner to have to avoid pinnacle rocks, for they usually appear close to land and they do not often rise to more than 200 feet from the bottom of the channel. Nevertheless, other dangers, less insidious, but still to be guarded against, must be considered by the navigator in this southern part of the route. The nature of these dangers and the measures which the respective governments, along whose shores they are located, have taken to safeguard ships can best be shown by a brief description of the route.

From Seattle, the beginning of the so-called highway, the steamer leaves behind the steep-hilled shores of Elliot bay, passing the lighthouse on West point out into Puget sound. The irregular coast line formed by the hills of the mainland and the islands along the way are difficulties for the mariner only in foggy weather, and the lights and fog signals are sufficiently numerous to insure against any such dangers.

Passing across the Strait of Juan de Fuca, the ship enters the smooth lanes winding between the San Juan islands. Sea traffic through these islands is heavy on account of their being on the Vancouver route. Their coast line has been surveyed and more or less adequate protection for vessels furnished. There has, however, been some complaint of late that more buoys are needed at certain points, and as soon as practicable these will be placed.

Must Avoid Tide Rips

Georgia strait, into which the vessel next passes, is wide and deep, like Puget sound, and the shore line is similar as far as the entrance to Seymour narrows, half way up the coast of Vancouver island. There the many small islands on the east side make the channel narrow, and the tide, rushing through, forms great whirlpools the center of which are sometimes three or four feet deep. None except the largest passenger steamers now attempt to buck this tide rip, for several boats have been lost in attempting it. Just at the entrance of the narrows a little to the right of the channel is a big pinnacle rock covered by only 12 feet of water. There are undoubtedly other pinnacle rocks through the narrows, for the characteristics of the glacier-made topography indicate it, but they are not so directly in the main channel, and unless the ship is caught by the tide, there is little danger of striking them. In the lower half of the passage there are one or two lighthouse stations, and through Seymour narrows several small lights and fog signals have been placed at jutting points.

At the northern end of Vancouver island the vessel enters Queen Charlotte sound, and just after leaving it crosses the longest stretch of unprotected water of the entire Inside passage, which is only a few miles at that. Then the ship again enters a narrow channel where the characteristics of the shores along the Strait of Georgia are repeated, except that as we proceed farther north, the hills grow higher and their descent into the water more sudden.

At the southern end of Pitt island, the passage grows still narrower and continues so to the end of the island, this being known as Greenville channel. The name of "lane" fits this part of the highway more than any part yet passed, for the green hills, covered with spruce to the water's edge, rise steep and high scarcely a vessel's length away on either side. Each hill forms a promontory jutting out unevenly into the smooth water, thus shutting off the vista farther on so that it continually looks as if the vessel were plying a long mountain lake with the end just ahead where

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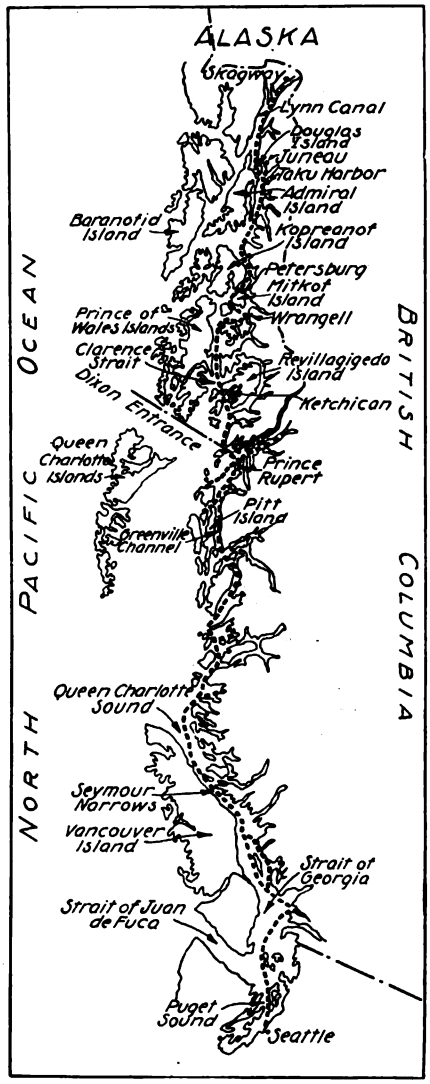
two hills dip to meet each other. Arriving there we find that just around the corner stretches a similar vista down a mirror lane of clear, green water.

This is a summer picture, however. In winter there often is no picture at all; for an absolutely opaque screen of snow shuts off the sight of water, land, and everything more than three or four feet away, and the density of it deadens the echo of the fog horn so that the ship must simply feel its way along. Even with the most careful navigation many vessels might have gone ashore in this channel, if there was any shore to get on. The hills fall away so abruptly into the water, however, that the channel is deep up to their very edge. Again, there are no small islands, and no submerged reefs or rocks have been discovered in the entire channel. Still another danger must be considered by the navigator of this narrow passage in the fall and winter; for when a stiff wind blows against the incoming tide the waters, so green and glassy in summer, are white on the crests and black in the troughs of the heavy seas, and the wise mariner does not enter the channel until the storm has blown over. The lights and fog signals in this narrow passage are few.

Dixon's Entrance is Often Rough

Passing out of Greenville channel, the vessel enters a basin from which one can look out through a wide channel between Prince of Wales island and Queen Charlotte islands to the open sea. In crossing this channel, called Dixon's entrance, the water is often made quite choppy by the tide rips, in spite of the small islands protecting the passage. The town of Prince Rupert, the western terminal of the Grand Trunk Pacific railroad, is situated in a well protected harbor opposite Dixon's entrance, and the international boundary line is just to the north of it.

Soon after entering Alaskan waters we come into the zone where dangerous pinnacle rocks have been found to be more numerous than in any other part of the Inside passage. Scattered through the channel small islands rise, sometimes only a few feet above the water, their sides of solid gray or red rock dropping away perpendicularly beneath the surface. The shore line of the channel is similar, and those who are familiar with such a glacial formation know that the same upward jutting rocks probably rise from the floor of the channel itself. Many wrecks in this vicinity have testified to the correctness of the theory.



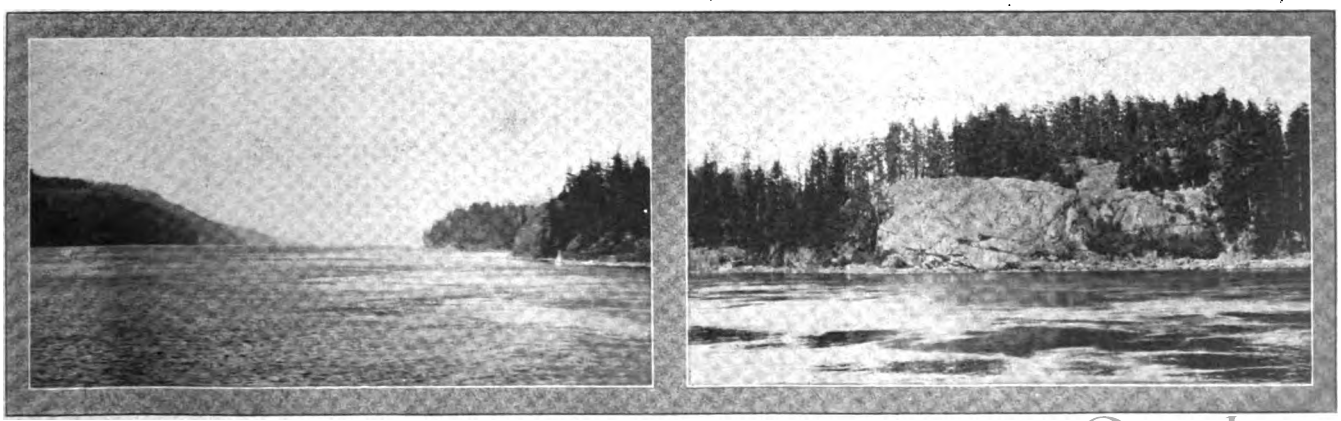
INSIDE PASSAGE TO ALASKA

It is in this district that the tallest pinnacle rock yet discovered has been found. This is called the Washington monument, and it more than makes good its claim to this name by rising 650 feet from the bottom of the channel to within 17 feet of the surface. It is located just off the main channel at the entrance to Thorne arm, the first of the long inlets reaching up into Revillagigedo island. From here until the vessel passes Ketchican it threads the rock-infested waters of Tongass narrows. These waters might well be likened to a spider's web; for they lie smooth as a lake of glass, mirroring in their calm depths the thickly strewn green islands, while beneath this beautiful surface lurks the trap of the pinnacle rock ready to stab the unsuspecting ship.

Channel is Marked by Blinker Lights

Government experts have, however, developed a means of warning ships of these dangers, which is sufficiently inexpensive in operation to offer a practical solution to the problem of protecting ships from the thickly sprinkled menace of the pinnacle rock. And it is in this district where the danger is so pronounced that the warning signals are used in such numbers as to direct attention to them. At every jutting point of the islands that border the channel, a small box-like concrete structure holds a light that flashes at regular intervals, and out in the channel itself iron buoys with similar lights mark the course to be taken. These are so thick that there are places where the ship cannot vary its course more than 10 feet on either side. Besides these "blinker" lights, there are in this channel spar buoys and post lanterns, which latter are usually steady burning oil lights.

For the "blinker" light, the fuel



ENTRANCE TO SEYMOUR NARROWS IS SHOWN AT THE LEFT—AT THE RIGHT THE TIDE RIP IN THESE WATERS

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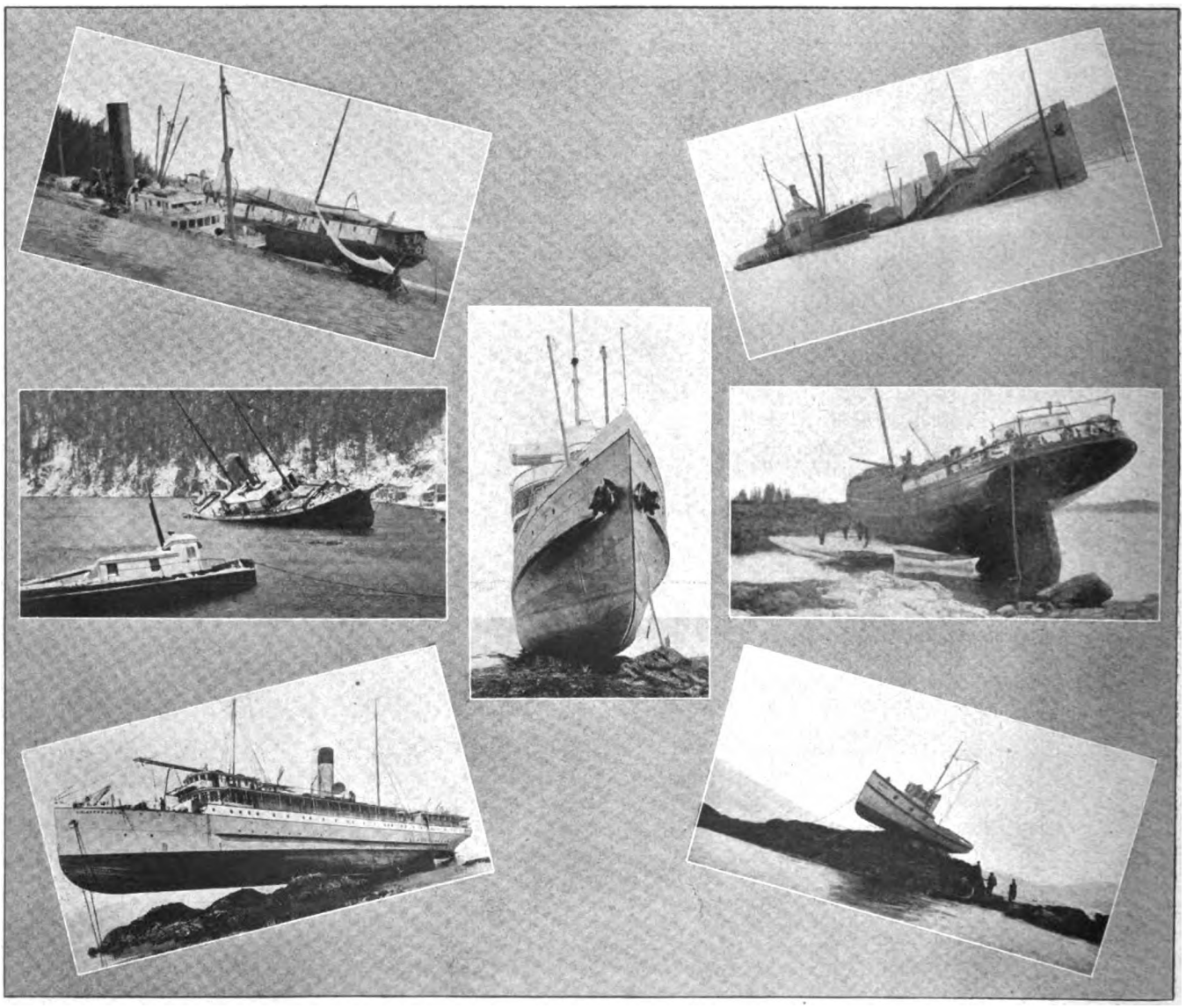
used is acetylene gas compressed to a density that is almost a liquid. The tank containing this is placed in the lower part of the buoy or in the box-like structure of the shore light. A leather diaphragm in the burner closes the opening at the sudden inrush of the gas, then drops, allowing a little gas to pass through. This is ignited by a tiny constantly burning flame fed through a small tube, and the flash is the result.

The compression of the fuel and the saving effected by the intermittent burning make it possible for the "blinker" light contained in even the small tank of the buoy to burn for many weeks without the supply being renewed. In fact, in some instances they have been arranged so as to burn a whole year without attention. In such a case, there are generally one or two reserve tanks which are automatically turned on when one is emptied. There are three ways in which these lights are more economical than the lighthouse stations: First, in the matter of construction and installation, the average cost of installing an acetylene light being about $1800 against the $125,000 required to build and install a modern concrete lighthouse station; second, in the fraction of personal attention required by the "blinker" and, third, in the amount of fuel used. Of course there is also the same most important reason for the use of the "blinker" light that has caused the change of the steadily burning light in lighthouse stations to the flashing light, that is, the certainty of its being distinguished as a signal and not taken for some other light on shore or on a boat.

The "blinker" light is quite a modern invention and was adopted by this country only a few years ago. It is just now being taken up by one or two others. When Alaska was first opened to commerce, the Canadian government was much more prompt than the United States in placing lights along the route. The first ones placed in Alaskan waters were installed in 1895, the only previous aids to navigation being a few inadequate charts and 14 iron buoys, which were established in 1884. The cause of this seeming procrastination on the part of the United States lighthouse bureau was a law which forbids the building of a lighthouse on any property until the government can establish an absolute title to it. The Canadian government was handicapped by no such law and went ahead erecting temporary structures as fast as they were needed. Since the adoption of the "blinker" by the United States,



THE TREACHEROUS WATERS OF ALASKA DEMAND A HEAVY ANNUAL TOLL IN WRECKS AND STRANDINGS

The upper left illustration shows the steamer SALVOR attempting to salve the wreck of the steamer SPOKANE in Seymour narrows in 1912. The upper right illustration is the steamer ADMIRAL EVANS wrecked at Hawk inlet near Juneau. The center left illustration shows two vessels wrecked near Seward on the southwest coast of Alaska, the steamer DORA and the tug UNCLE SAM. The PRINCE RUPERT is shown high and dry on the rocks in the center illustration. She went ashore near Dixon's entrance in 1917. The center right illustration is the barge BANGOR wrecked in 1916 at the entrance of Tongass narrows. The lower left illustration shows the PRINCESS MAY piled up on the rocks outside Juneau on Sentinel island. The fishboat SUNRISE high and dry on Channel island in 1917 is shown at the lower right.

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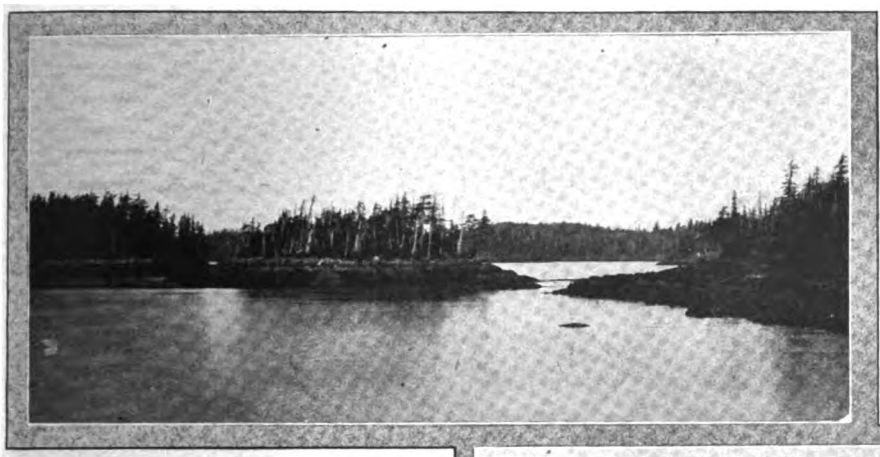

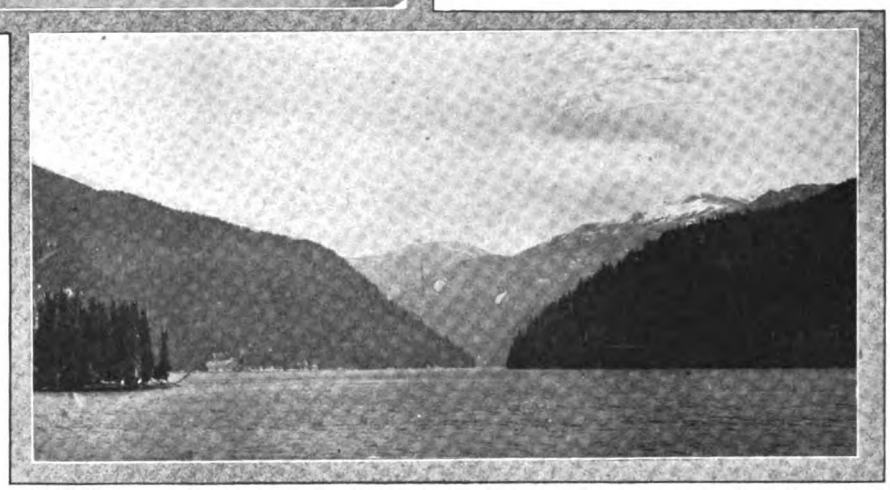

UPPER ILLUSTRATION SHOWS HOW THICKLY SCATTERED THE SMALL ISLANDS ARE IN THE WATERS ABOUT KETCHICAN—HOW THE NARROW INLETS, UPON WHICH MOST OF THE CANNERIES OF SOUTHWESTERN ALASKA ARE BUILT, WIND BACK AMONG THE HILLS MAKING NAVIGATION DIFFICULT IS SHOWN IN THE LOWER ILLUSTRATION

however, the part of the Inside passage in Alaskan waters is much better lighted than the Canadian channel, where there are few lights except the lighthouse stations.

In the harbor of Ketchican there are many oil-post lanterns which require attention once a day. After passing out into Clarence strait, however, the vessel travels for another day among islands from whose exposed points "blinker" lights wink at it through the darkness of the fog or the night. At the end of the day's journey, the ship reaches Wrangell and, leaving this interesting old town with its wealth of totem poles and other Indian relics, it passes around the end of Mitkof island and up between this island and Kopreanof, through Wrangell narrows, famed for their beauty and dangers.

Icebergs Often Cause Disaster

Petersburg, a flourishing fishing town, is in the northern end of the narrows, and then the ship proceeds northward into a wider channel, with the hills growing gradually higher, the channels deeper, and the menace of the pinnacle rock less frequent. This channel is called Stephens passage. Toward the northern end of it, reaching into the interior, is Taku inlet, and at the head of this inlet Taku glacier is constantly dropping great pieces of ice into the water. These float as far south as the southern end of Admiral island and often take a northerly course going beyond Douglas island and into Lynn canal. They are not so large as those in the northern Atlantic, but they are of sufficient size to be dangerous even to the largest ships, having been the cause of the loss of several vessels.

From Taku inlet it is only a few miles to Juneau, capital of the territory, then the vessel passes around the southern end of Douglas island and turns north again into Lynn canal, which resembles Greenville channel in the abruptness of its shores, except that the mountains are much higher and most of them are topped with snow and glaciers, with the bare red rock showing below them. Except for the last few miles at the northern end, however, the canal is much wider than Greenville channel. Just around Douglas island from Juneau in the center of the channel is Sentinel island, which has been the scene of more than one wreck, but on which there now stands a big lighthouse. Half way down the canal is another lighthouse on a small island called Eldred rock, which has on its record the sinking of the CLARA NEVADA in 1898, when all hands were lost and only one body ever recovered. This is one of the mysteries of the sea, for generally the loss of life from wrecks in the Inside passage has been light.

The trip from Seattle to Skagway is 975 nautical miles, of which 510 are in Canadian waters and 465 in United States waters. About 400 miles of this journey are in Alaskan waters. Having passed over this we have traversed only a small fraction of Alaska's 26,000 miles of shore line; but this series of narrow sea lanes is the real highway. It was along this route that the vessels plied during the great gold rush in the mad days of 1898 and 1899. Arriving in Skagway, the gold seekers tramped over the White Horse pass to Dawson and into the heart of the mining country, and it is by this route that the interior is reached today. Besides the importance of this channel as the main route to the interior there is also the fact that it is bordered by the most thickly settled region of the territory, two-thirds of Alaska's entire population being in the southeastern division. That the government has realized the importance of this thoroughfare is shown by the records of its surveys, for more work has been done along this route by the coast and geodetic survey than in any other similar large area in Alaska. The Canadian government has also made a more or less complete survey of its part of the route.

War Brought New Business

This description of the Alaska waters applies only to the main channel, however, from which only passenger boats of the Canadian Pacific and the Grand Trunk Pacific do not deviate. All boats carrying freight call at the canneries, which are invariably in some otherwise unfrequented inlet. Gold mines are also scattered through the northern part of the passage, and most of the boats make these small stops. The war increased the number of canneries by at least 25 per cent, and the new ones were often established in all kinds of out-of-the-way places.

Last August, I made the trip on the JEFFERSON of the Alaska Steamship Co. This boat stopped at several canneries along the route, and at the entrance to only a few of them there were sufficient signals to guide any mariner not thoroughly familiar with the site. The mas-

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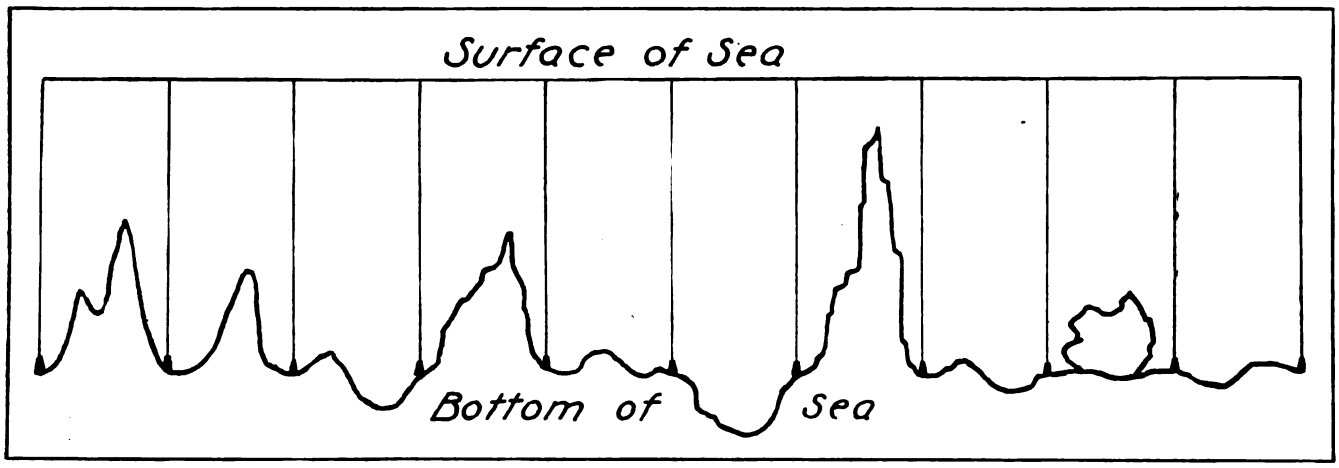


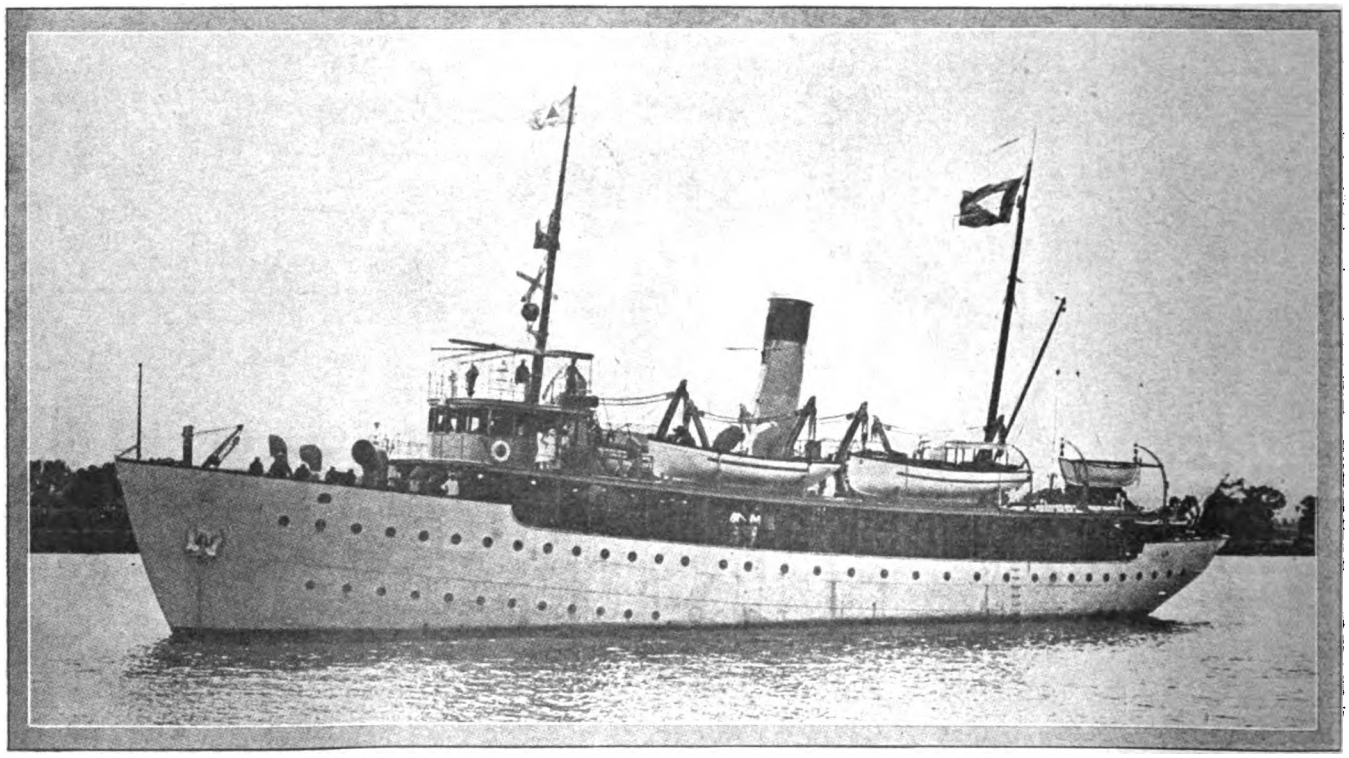
GRAPHIC ILLUSTRATION TO SHOW HOW THE BOTTOM PROFILE OF THE OCEAN BED IN ALASKAN WATERS IS FREQUENTLY FORMED

The lead line is of little use in charting regions where the ocean bottom is of this character for there is little chance that a lead thrown at regular intervals from a moving vessel will strike the summits of these pinnacle rocks. Even if the lead should strike such a pointed rock it would be likely to glance off and record the greater depth at the base of the rock

ter of the JEFFERSON, Capt. J. G. Nord, who has been sailing Alaskan waters for 24 years and whose record is one of the best of any master of a vessel navigating the territorial waters, has had only one slight accident. But this record is to his own credit entirely. To prove it, old time residents of Alaska, who make the trip two or three times a year and who time their going by the sailing of the JEFFERSON, will tell you of the time two years ago when he lay behind Sentinel island for over 36 hours, while a storm blew and cablegrams flew from Skagway to company headquarters and back again.

Many are the wild tales Captain Nord told us on this trip of the days when he navigated Alaskan waters practically without a chart and of the many wrecks of those days on the reefs and pinnacle rocks and of the custom of naming each of these submerged rocks for the vessel that found it by stranding on it. Due to lack of funds, the United States coast and geodetic survey has continually followed commerce in Alaska, instead of preceding it. From 1867 to 1917 there were approximately 425 vessels wrecked in Alaskan waters, with a loss of about 500 lives. Three of these vessels belong to the national government.

Over half of this number was lost in the 20 years from 1898 to 1917, showing that the survey work has not kept up with the increase in traffic, for of the 224 vessels listed as totally lost within this time 156 were stranded, 33 foundered, 13 burned, three were crushed by ice, while the causes of 19 of them are unknown. Most of the losses caused by stranding have been classed by officers of the coast and geodetic survey as unavoidable, owing to lack of complete surveys. About one-third of the vessels included in this list of total losses of the last 20 years have gone down in the waters of southeastern Alaska; while over half of these have been lost in the Inside passage. Of these the majority again have been classed as unavoidable, this in spite of the fact that the hydrographic survey of the main channel is nearly complete.



UNITED STATES COAST AND GEODETIC SURVEY STEAMER SURVEYOR— THIS CRAFT IS A MODERN SURVEYING VESSEL DESIGNED ESPECIALLY FOR WORK ON THE PACIFIC COAST

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This is not the contradiction it seems, because most of the losses of the last few years have not been in the main channel, but in or at the entrance of inlets where the survey was inadequate; and where wrecks have occurred in the main channel—pinnacle rocks or sharp rocky ledges have been the cause. It is often impossible to locate these by even the most careful hydrographic survey for the reason that a lead thrown at regular intervals from a moving vessel will not be likely to strike the top of the rock, and even if it should strike the top of such a pinnacle it would probably glance off and record the greater depth at the base of the rock.

Locating the Rocks

The only way to locate these pointed rocks exactly is by the use of the apparatus known as the wire drag. The main parts of a wiredrag are a horizontal wire maintained at any desired distance below the surface of the water by an arrangement of weights and adjustable upright cables extending to the surface buoys. This apparatus is towed by two launches, one at each end. As the drag passes through the water it will catch and show the location of any obstruction extending above the plane of the horizontal wire, which is usually placed at 60 feet, since most of the vessels plying Alaska waters draw not more than 24 feet. Knowing the location of the obstruction, the least depth on it can easily be found by sounding with lead and line from a small boat.

It was in this way that practically all of the pinnacle rocks located by the coast and geodetic survey in Alaskan waters were discovered, and the value of a complete survey by this method of the rocky shores of southeastern and southwestern Alaska is inestimable. The nature of the coast of the peninsula north of the Aleutian islands is sandy, so that such an exact survey is not needed in that region. A careful survey with large vessels is necessary, however; and the coast and geodetic survey has never a sufficient number of staunch, properly equipped vessels for this purpose, so that the work has been only of a preliminary nature. The only vessels ever built especially for the work are the PATERSON and the SURVEYOR, the latter completed in 1917. Survey work was at a standstill during the war.

The main steamer route of the Inside passage from Dixon's entrance to Skagway has been completely surveyed and 60 per cent of it has been swept with the wiredrag. The wrecks of recent years show where this has not been done. This work has been retarded by the lack of funds for equipping and maintaining a sufficient number of units. Two parties have been engaged in dragging the Inside passage for the past three summers, but in order to complete the work within the next few years more suitable equipment and men trained for the purpose are needed.

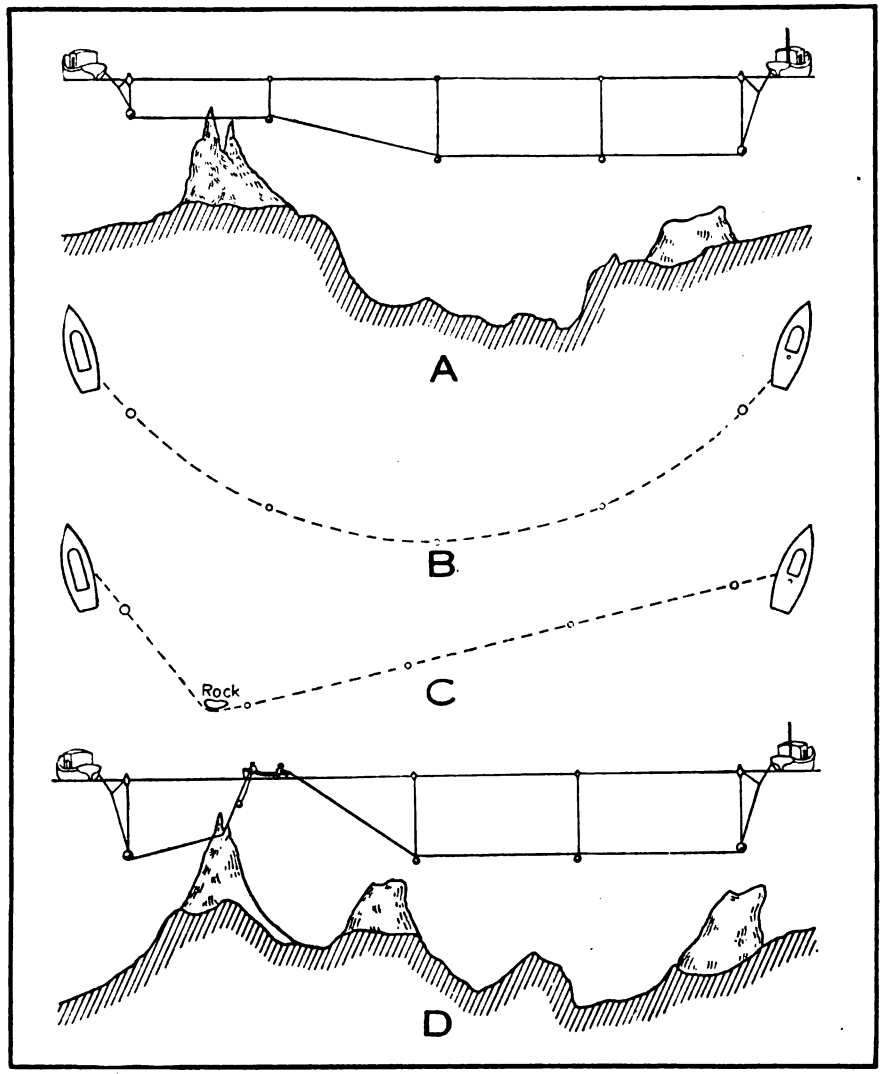
The greatest drawback has been the type of boats used. Having no boats built for the work, the coast and geodetic survey has been forced to rent launches and install the equipment at the beginning and dismantle it at the end of each season. It has been difficult to obtain the suitable boats for the following reasons:

1.—Pleasure launches usually have enough power, but their hulls are too weak.

2.—Fishing and working launches are generally of sturdy construction but are usually low powered.

3.—Small gas tugs have too low freeboard and so much power that they cannot be regulated for towing the drag to obtain the desired result.

Staunch fishing boats with good engines are the best suited for wiredrag work of any that can be chartered, but here the government in renting them must compete with the amount the owner can make in the fishing industry, where generous earnings may be relied upon. This makes the rental generally paid for them abnormally high. They are uncomfortable for men to live in a whole season; for they have practically no living accommodations, and the smell of fish, which clings to them as long as they hold together, is nauseating. Vessels built especially for the purpose would be far more efficient and much less expensive to operate then those that have been used in the past.



PINNACLE ROCKS ARE BEST LOCATED BY MEANS OF THE WIRE DRAG. "A" IS THE DRAG SET AT DIFFERENT DEPTHS, "B" IS A PLAN OF THE DRAG UNDER WAY, "C" SHOWS THE DRAG AGROUND ON A ROCK WHILE "D" SHOWS HOW THE DRAG IS CLEARED

Have Designed Adequate Boats

Officers of the coast and geodetic survey have made plans of the type of boats needed, and they are hoping that appropriations will be made for them soon. Their plans include two towing launches which should each

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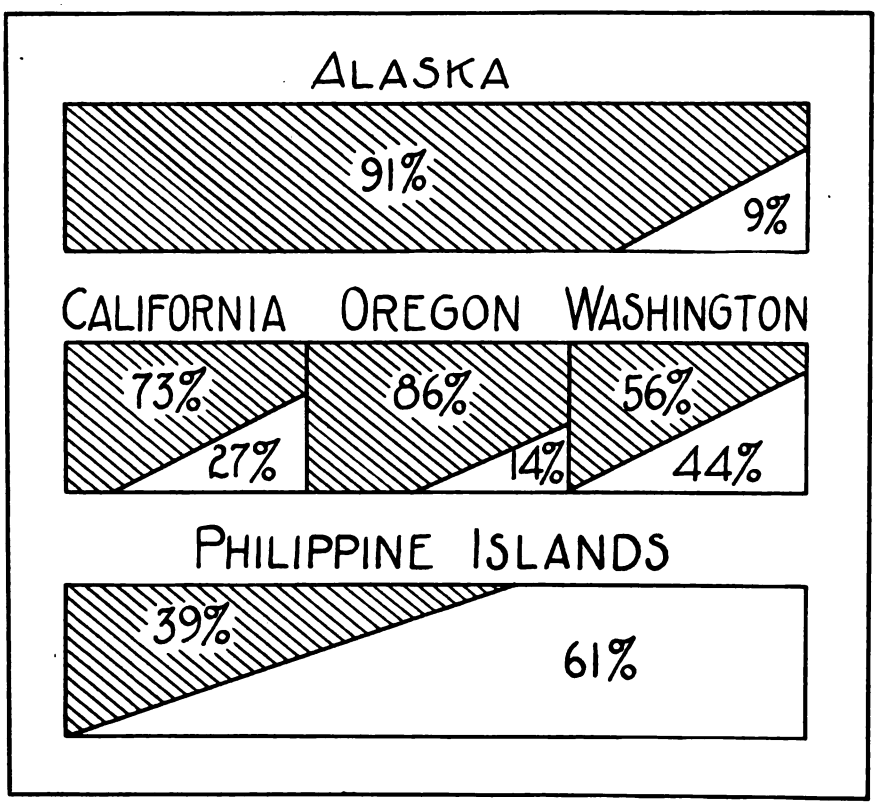
have a length of from 50 to 60 feet and a minimum speed of 10 miles per hour. They should be of heavy build and should have plenty of clear deck space to permit the installation of the machinery used for setting out and taking in the drag. These boats are supplemented by one or more smaller launches that are used for patrolling the drag, sounding on shoals, clearing the drag from shoals, etc.

There are few towns in Alaska available for use as headquarters for a wiredrag party, and it is therefore necessary to use, in addition to the boats mentioned above, a larger vessel of sufficient size to carry a considerable amount of supplies and to provide living accommodations for the party on the working grounds. This vessel is frequently used for towing one end of the drag and also acts as a tender for the subparties, as a wiredrag party in Alaska must carry on triangulation and topography in addition to the drag work. There should be at least three drag parties working along the shores of southeastern Alaska.

With this equipment wiredrag work in the main channel of the Inside passage could be quickly finished, which would result in advantages in developing vast areas in Alaska and in giving her resources to the mother country.



COMPARISON OF THE SURVEYED AND UNSURVEYED WATERS OF ALASKA, CALIFORNIA, OREGON, WASHINGTON AND THE PHILIPPINE ISLANDS—SHADED SHOWS THE UNSURVEYED WATERS AND WHITE THE PORTIONS THAT HAVE BEEN SURVEYED—THIS COMPARISON SHOWS THAT MUCH REMAINS TO BE DONE BEFORE ALASKAN WATERS ARE SAFE FOR NAVIGATION

Radicals Checked on West Coast

Puget sound shipyards were still idle early in March following the general walkout at the steel plants effective Jan. 21. The firmness of the government in stating that no negotiations will be opened with the men until they return to work has served to convince the leaders of the present walkout that it has been a huge failure.

The details of the so-called general strike of all union labor at Seattle and Tacoma Feb. 6 to 10 are well known. At Tacoma, the effort was less successful than at Seattle but the cause of the shipworkers did not meet with the enthusiastic response from other workers that the shipbuilders had hoped. The firm stand of Mayor Ole Hanson of Seattle helped to break the back of the general strike and to weld together those elements of the citizenship who had not been awed by the defiant attitude of the radicals.

The Pacific Coast Metal Trades district council held a long and stormy session at Portland, Oreg., recently, at which the more conservative element held sway. The position of the Puget sound councils was not given enthusiastic endorsement and the attitude of the Portland meeting exerted considerable weight in breaking the spirit of the Puget sound leaders. Dr. L. C. Marshall, representing the shipping board, appeared at this conference and plainly told the leaders the position of the government. It was emphatically stated that nothing would be done for the men as long as they were not at work and were in the position of having broken their agreement with the shipping board.

The Portland council decided to order a vote on the question of a coastwise strike April 1 for higher wages, following the expiration of the Macy agreement. The Puget sound leaders fought for an immediate strike in support of their position but they could not gain their point.

The firmness of the shipping board in prohibiting steel shipbuilders from paying wages higher than the Macy scale, on penalty of having contracts canceled, undoubtedly helped to win the fight on Puget sound. This was evidently an attitude unexpected by certain labor leaders who during the last two years have become exceedingly arbitrary in that district. The second factor contributing to the failure of the present strike is the refusal of the coast conference at Portland to order an immediate strike in support of the Puget sound locals.

That the trouble on Puget sound was instigated by radical and unscrupulous leaders is the assertion of federal and local officials who have been active in arresting and prosecuting anarchists, bolshevists and I. W. W., many of whom have been prominent in labor circles. That the strike was not a walkout but an attempted revolution or rebellion is freely asserted. That the walkout was ordered illegally, without giving the rank and file opportunity to express themselves is another statement coming from authentic sources. It is certain that many of the men did not want to quit work but were forced to leave their tasks.

The shipyards announced that on Feb. 19 the yards would open, on the basis of the Macy scale, that union wages and conditions would be observed but that the employers would hire at the gates and thus eliminate inefficient workers and agitators. This plan was abandoned at the suggestion of government officials and the outcome of the Portland conference was thereupon awaited.

The idle period has given the shipyards opportunity to clean up and do repair and replacement work which has been impossible during the rush of the past two years. The wood yards have been likewise idle as well as the steel and wood plants dependent on shipbuilding.

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Activities in the Marine Field

Latest News from Ships and Shipyards

Gale Fails to Damage Fleet at Buffalo

ON March first, Lake Erie was visited by the most severe gale of the season. Much apprehension was felt in marine circles in Buffalo for the safety of the large fleet moored at that port. Under the breakwater, several vessels dragged their anchors as did a few ships moored at inside berths. Taken as a whole, however, the actual damage encountered was light. The stern end of the steamer D. Z. NORTON of the Richardson fleet, which was discharging grain at the Grand Trunk railroad elevator, parted her mooring lines and was blown over against the steamer VENUS of the Interlake Steamship Co. To external appearances, no damage resulted. At the Mutual elevator, the forward end of the W. D. CRAWFORD broke loose to sweep across Blackwell channel. She did no damage, however. The forward end of the stern section of the VAN HISE, which was moored in the Erie basin, broke some of its mooring lines and was blown across the basin where it collided with a scow. Tugmen, who made temporary fastenings, reported that no damage resulted. The J. H. REED dragged both her anchors but tugmen who brought her back to her berth reported no damage to the vessel. Several other vessels dragged their anchors and the fact that no serious damage resulted was commented upon freely by lakemen. River men estimated that the wind reached a velocity of between 60 and 70 miles an hour during the height of the gale.

* * *

During February, Buffalo elevators removed 14,582,000 bushels of grain from the winter storage fleet. Seventy-one vessels of the grain storage fleet have been unloaded at Buffalo so far out of the 117 that went into storage with grain at the close of navigation in 1918. This leaves 43 ships containing approximately 14,500,000 bushels.

* * *

City officials and industrial leaders of Erie, Pa., are making an effort to obtain federal and state appropriations to be expended for harbor improvements. A committee of four members has been appointed, headed by Lieut. Commander W. S. Marrison. The committee will visit a number of Great Lakes ports and report on improvements. New docks and docking facilities, grain elevators and storage accommodations, together with a ship canal through the neck of Presque Isle peninsula, are included in the tentative plans.

* * *

The American Shipbuilding Co., Detroit, recently launched two vessels for the Emergency Fleet corporation. Shipbuilding work on the Great Lakes has progressed rapidly during the winter owing to the mild weather.

* * *

The largest amount of ice for the season at Duluth was reported recently as a result of a cold spell at that port. The thermometer registered 22 degrees below zero, an unusual mark for the past open winter.

* * *

At the regular monthly meeting of the American Shipbuilding Co. held recently, routine business was discussed. No change in the ship program was announced. Launchings of vessels are to take place three or four times a week because of the open weather.

* * *

The steamer COMPTON, which went on the rocks near Crossover light, five miles west of Brockville, has been purchased from the underwriters and efforts will be made to release her during the coming season. Toward the close of navigation last year the COMPTON met with two mishaps when running west from Montreal light and was finally abandoned to the underwriters at the point named.

* * *

The Lorain, O., yard of the American Shipbuilding Co. recently launched steamer No. 775, which is building for the Emergency Fleet corporation.

* * *

Work on the steamer VULCAN, sunk at Houghton, Mich., recently has been started by the Reid Wrecking Co. Captain Reid, in charge of the operations, expects to have the steamer afloat and in shape to be taken to port at the opening of navigation in the spring. The VULCAN has been resting on the bottom since last fall and was abandoned by her owners to the underwriters.

* * *

Charged with negligence in permitting the fire tug GEORGE R. POTTER to become unseaworthy, John J. Hylant, pilot, and Eugene T. Day, chief engineer of the vessel, must stand trial before the United States local inspectors of steamboats at Buffalo. The POTTER sank at her dock recently. The inspection board conducted an investigation of the sunken craft and examined several witnesses and handed down a decision fixing the blame on the pilot and chief engineer.

* * *

Walter M. Williams, assistant government director of operations on the Great Lakes, recently went to Washington to confer with officials about the building of two large oil storage tanks in Cleveland as a means of supplying government oil-burning vessels. The total capacity of the proposed tanks is estimated at 20,000 barrels. Plans for sending 154

Little Ice in Lakes

RECENT reports from the United States weather bureau, Detroit, contain interesting figures on lake ice conditions. These figures show that in comparison with an average for the last 11 years, there was early in March 10 inches less ice at Duluth, 3 inches less at Sault Ste. Marie, 8 inches less at the Straits of Mackinac and 7 inches less at Escanaba. There was less ice in all lakes this year than was reported last year for the same period.

In Lake Superior a small field was reported along the south side of Minnesota point that extended about 8 miles along the Wisconsin shore. Also there was a small field off Portage canal and some slush ice from Point Sable east to Whitefish point. Whitefish bay contained no ice.

In St. Marys river the ice was 16.5 inches thick. At Escanaba the ice was 16 inches thick. In Lake Michigan no fields were reported except some slush ice in the extreme southwest portion and at the Straits. Here the ice fields were light and broken and drifting with the wind. In Lake Huron small fields of slush ice were reported in the northern portion. Lake St. Clair was practically free of ice. Detroit river was open to Lake Erie. No ice was reported in Lake Erie or Lake Ontario.

The lake route between Cleveland and Detroit was opened for service on March 10 with the departure from Detroit of the steamer EASTERN STATES, *commanded by Capt. John Lightbody. The* EASTERN STATES *left Detroit at 8:30 a. m. At 10:45 p. m. the* WESTERN STATES *left Detroit in command of Capt. S. O. Robinson at which time the* EASTERN STATES *started on her return trip to Detroit, thus establishing regular night service each way. The date is about 16 days earlier than that of last season.*

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more government oil-burning ships from the Great Lakes ports where they are now under construction to the Atlantic ocean through the Welland canal were also taken up by Mr. Williams while in Washington. One hundred vessels have already been sent to the Atlantic. Approximately 100 government coal-burning vessels will be in operation on the Great Lakes this season, Mr. Williams estimates.

* * *

Body of a sailor recently found at the head of Wolfe island has been identified as that of Charles Ivor Johnson of Buffalo. Papers found on the body proved that the dead man was a wheelsman on the steamer MANOLA.

From the East and South

THE fastest passage in recent years between Boston and Buenos Aires is recorded of the Norwegian bark BESSFIELD, Captain Larsen, which covered the 6500 miles in 54 days. The barkentine J. S. EMERY, Captain Fickett, was 78 days on a similar passage. Both vessels were lumber laden.

* * *

The former Boston pilot schooner HESPER recently arrived at that port from Bucksport, Me., with a cargo of herring, having been purchased by Capt. T. M. Nicholson who equipped her with auxiliary gasoline motors.

* * *

Coal barges regularly in the trade between Virginia and Boston are being rigged as 4-mast sailing vessels, the latest being the COASTWISE owned by the Potter Transportation Co., at Machias, Me. Two former full-rigged ships, the E. B. SUTTON and I. F. CHAPMAN were given schooner rig several months ago and now are on oversea voyages.

* * *

Boston has developed a splendid export trade with Cuba and, for February, the United Fruit Co. ships carried 25,000 tons of general merchandise to the island, the consignments having been loaded at Long wharf.

* * *

Boston's fishermen's strike which involved a dozen steam trawlers for a period of three months has been settled. The masters are to receive $125 per month and 3 per cent of the stock, the mates getting $110 per month and 2 per cent. Earnings of skippers average about $5000 a year under the new scale. The concerns affected were the Bay State Fishing Co. and the Gorton-Pew Fisheries.

* * *

Capt. Aaron W. Soria, Boston, master of the American bark MONTAUK, died recently of influenza at Manila and was buried there. The vessel was bound from Australia for San Francisco and put in to place the captain in hospital. Captain Soria had commanded barks GAEL, B. F. HUNT and H. G. JOHNSON. He was 64 years old and ran many years in the lumber trade between Boston and River Plate.

* * *

Service between Boston and Yarmouth, N. S., by the Eastern Steamship Lines, Inc., was resumed in March with the NORTH LAND. The Canadian steamship ARANMORE which maintained sailings during the winter has been returned to the Canadian government. The NORTH LAND is commanded by Captain Ingalls with Captain McKinnon, formerly of the PRINCE GEORGE, as pilot.

* * *

Steamer LADY OF GASPE soon will be scheduled on the run between Boston and Halifax, N. S., in service of the Nova Scotia Steamships, Ltd., alternating with the SAGAMORE.

* * *

The Boston Marine society now has 85 beneficiaries for whom each quarter about $4700 is appropriated.

* * *

Steamship GEORGE WASHINGTON which landed President Wilson in Boston recently is the largest vessel ever to enter that port, being of 25,570 gross tons. Pilot J. G. Hartling of the Boston Pilot association brought the ship into President's roads and also took her out.

* * *

The Maritime Coaling Co., Boston, supplied the steamship MT. VERNON, 7700 tons of bunker coal in 80 hours, at the same time bunkering the RAPPAHANNOCK with 2200 tons. The MT. VERNON contract sets a new time record for the port.

* * *

Capt. Edward Ellis of British steamship COTTESMORE died recently at his home in Liverpool. He was well known in Boston.

* * *

The National Shipbuilding Corp., Three Rivers, Canada, has purchased the shipbuilding plant of the Alabama & New Orleans Transportation Co., Violet, La., about 12 miles down the river from New Orleans, and will continue construction of steel tankers and barges for the Pan-American Petroleum & Oil Corp., which has a refinery at Destrahan, La., and oil wells in the Tampico district, in Mexico. The first steel ship ever constructed south of Newport News was launched at Violet from the yards of the transportation company last year, since which time three other tankers of the same type and size—2300 tons—have been built and launched there for Mexican oil service. The National company takes over the complete yards which employ 500 men.

Along the Pacific Coast

THE 5-mast motor schooner JANET CARRUTHERS, which went ashore at the entrance to Grays Harbor, Wash., Jan. 22, is lying on the beach and it is possible that efforts may be made to salve her. It is stated that it may be necessary to excavate a channel through the spit to get her back into deep water but whether this will be feasible is not known as the hull is said to be badly hogged. The underwriters, who have taken over the work, have received bids for the vessel. Her value was $400,000 and when she went ashore she had a part cargo of large Puget sound timbers consigned to Japanese shipyards.

* * *

The port of Seattle, which made a profit of $700,000 on its terminal properties last year, has announced that rates will be reduced to the end that charges may cover operating expenses only. The profit of 1918 was possible largely because there was a heavy movement of Oriental freight. The port paid no taxes and charged off no depreciation. The commissioners have been severely criticized for their excessive charges which, it is claimed, have placed Seattle at a disadvantage compared with other ports. Now the port is revising its tariffs and will reduce its charges to a level that will meet operating expenses and overhead.

* * *

While Oriental vessels are bringing but little cargo from China and Japan at this period, outbound vessels are leaving with full cargoes of cotton and steel. These two commodities make an ideal combination for stowing and for filling a ship's capacity. The steel is being moved to Japanese shipyards for the construction of new tonnage, some of which is being built in Japan for the United States shipping board. The cotton is a seasonal cargo and it is consigned to Japanese mills.

* * *

Puget sound is again to have direct steamship service with Great Britain via the Panama canal. Two lines have resumed service on this route. The Harrison line has dispatched the steamship PROFESSOR from Liverpool for the Pacific coast and the Blue Funnel line is sending the steamship EURYPLUS to Puget sound. Until two years ago, this route offered regular service via the canal but the exigencies of the war diverted the tonnage elsewhere and service was discontinued. The Blue Funnel line has also resumed its regular sailings between Puget sound and Manila via China and Japan. The steamship CYCLOPS was the first to come since the service was interrupted months ago.

* * *

One outcome of Seattle's general strike is the resumption of the open shop on the waterfront. The longshoremen had just negotiated a new agreement with the employers when they joined the general walkout. The result is that the employers have since refused to recognize the union and open shop conditions again prevail.

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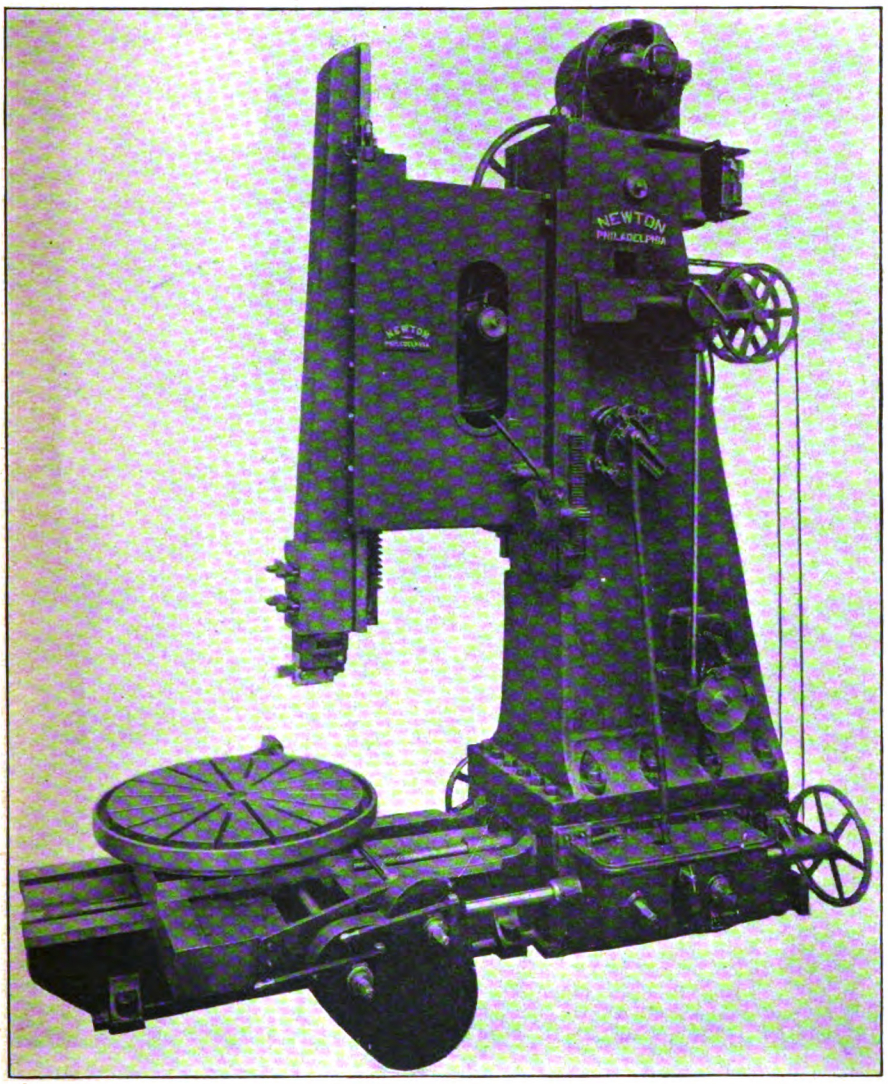
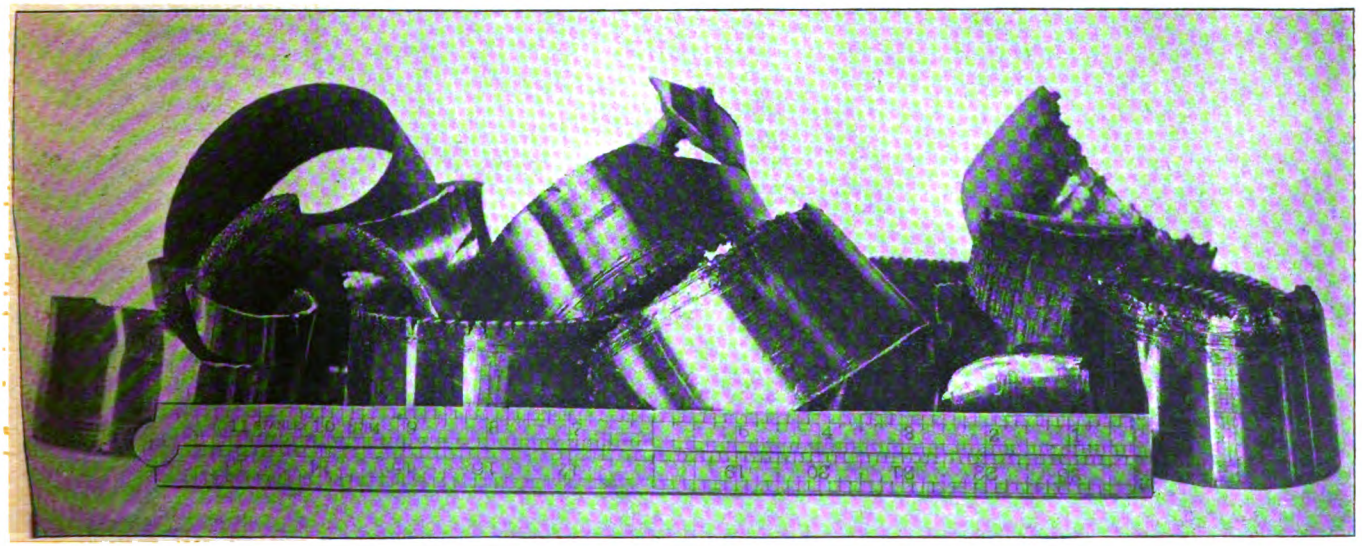
Equipment Used Afloat and Ashore

Generating Planer—Power Press—Wireless Meter—Electric Drill—Multiple Spindle Drill—Punching, Trimming and Shearing Press—Pipe Bending Machine

FOR machining heavy marine work having an irregular contour, and for all kinds of heavy keyseating, the slotter or upright generating planer is one of the most useful machine tools to be found in the marine engine builder's machine shop. The slotter is especially adapted for planing to a scribed line, owing to the fact that the cutting stroke is always downward. For this reason, the cutting action of the tool does not throw up heavy burrs that tend to obliterate the line to which the machinist is working. The slotting machine shown in the accompanying illustration was recently developed by the Newton Machine Tool Works, Philadelphia. The platen, which is circular



in shape, has three movements, all controlled by power feeds. It can be rotated for planing arcs or fed in and out and longitudinally for working to straight lines. It is of substantial construction throughout and is designed to work to maximum capacity. The machine is driven with a reversing type planer motor which runs at a speed between 400 and 1200 revolutions a minute. The reversing at the end of the cutting and return strokes is accomplished by the stroke control disk shown in the illustration. The trips on this disk can be operated by hand if desired, while the machine is in motion. This is desirable under some conditions as the drift of the motor has to be compensated for.



UPRIGHT GENERATING PLANER ESPECIALLY ADAPTED FOR MARINE WORK AND SOME OF THE CHIPS CUT IN ACTUAL PRACTICE

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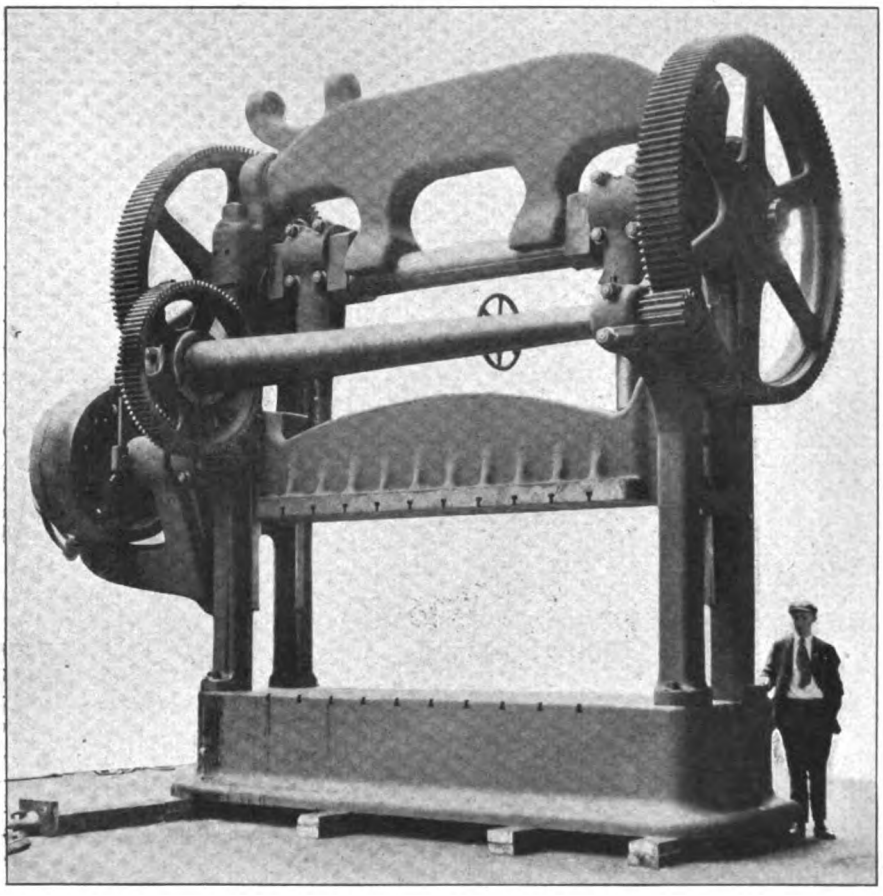

POWER PRESS WITH TAPERED BACK SHAFT TO COMPENSATE DRIVING STRAINS

This control apparatus is located on the bottom of the upright where it is within convenient reach of the operator. The machine is equipped with an adjusting rack on each side of the frame. The adjustment is by means of worm gearing which is arranged to be opposed in directions of operation.

The ram or cutter bar is counterweighted and has square bearings of sufficient size to insure long life. A taper side adjusting shoe is provided for taking up wear as it develops. The vertical clamping surface is steel faced and is provided with suitable tool holding clamps. Beneath the ram is located a steel swiveling relief tool box apron which can operate in any point of a complete circle.

Power from the motor is transmitted to the steel rack that operates the ram through the medium of steel spur gearing. These gears are of coarse pitch and are wide faced to insure maximum wear without unnecessary noise. All gearing is covered and on the operating side of the machine, all the gears are completely enclosed.

The circular platen is heavily ribbed to insure it against springing when work is strapped in place. The platen has a full bearing on the saddle to which it is held by corner clamps. The platen is centered by means of a deep faced large diameter bearing and is provided with 16 T-slots to facilitate strapping work in place. The oil pan around the platen is cast integral. Its periphery is turned to an accurate finish and is graduated in 360 degrees. This feature is of value while laying out many kinds of work.

The saddle on which the platen is located has a narrow guide alignment with a centralized location of the feed screw. A taper shoe is provided to control the fit. Hand adjustment of the saddle is provided for from both ends of the cross slide.

All feed motions are clutched independently by means of separate levers. The cross slide is of heavy box-type section and has square bearings on the base with a side adjustment by means of a taper shoe. The adjustment is from the operating side as well as from the front of the machine. All feed screws are equipped with bearings on each end to insure proper tension in operation.

Heavy Power Press

The machine shown in the accompanying illustration was designed for heavy press work by the Ferracute Machine Co., Bridgeton, N. J. It is substantial in construction and is built to withstand pressures up to 500 tons. The machine can be driven by a belt from the main shaft or by direct motor drive. Provision is made for attaching a motor shelf at the top of the press.

The tensile stresses are taken by four 5½-inch steel rods which are shrunk in the cast iron columns. This method of construction was used to permit maximum strength with minimum weight. The ram has a vertical movement of 18 inches and travels between five and six strokes per minute. The clearance between the side columns is 148 inches and the clearance from the bed to the ram at the top of its stroke when adjusted to its highest point is 60 inches.

Power is applied by a substantial combined friction clutch and brake. The ram is driven by two connecting rods actuated by cranks which are placed as near the housings as possible to avoid strain. The crankshaft is driven by two heavy spur gears. The back shaft, which drives the crankshaft through the medium of two pinions, is tapered to equalize the torsional strain. As one of the driving pinions is at a comparatively long distance from the driving gear while the other is quite close, it is obvious that quite a torsional strain is set up in the shaft while the press is in operation. By equalizing this torsion both of the driving gears on the crankshaft are driven with equal pressure, tangentially on their teeth.

Meters for Radio Work

Designed particularly for wireless and other high-frequency work, the hot-wire measuring instrument shown in the accompanying illustration, depends for its operation upon the expansion of a metal strip which is heated by the current to be measured. The device was developed by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. The slight sag

METER FOR WIRELESS WORK

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in the conducting strip is magnified several hundred times on the scale by means of a combination of wires and a deflecting spring.

The conducting strip is made of noncorrosive material. The separating posts have the same temperature coefficient of expansion as the conducting strip, so that changes in the surrounding temperature do not cause an error in the reading of the instrument.

The instruments are furnished in two forms, for flush mounting and portable. The instrument shown is of the portable type. The flush mounting form is of the round open-face type. The face is 3 inches in diameter, and the diameter outside the flange is 3¾ inches. It has a black case and rim, with white dial.

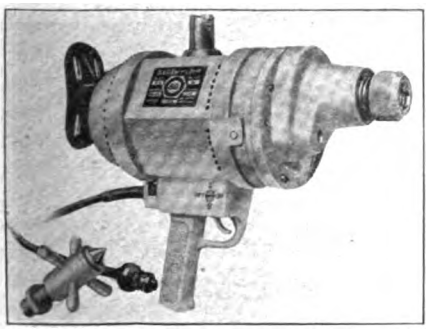
The portable form illustrated is mounted in a morocco-leather-covered wooden case with heavy glass over the dial. The case is 3¾ x 4⅜ inches and 2 inches thick. The scale plate is made of metal, and the scale subtends an arc of 90 degrees, being 2⅜ inches long.

The flush mounted meters have a guaranteed accuracy of 2 per cent while the portable meters, with hand marked scale, can be expected to show an accuracy within 1 per cent of full scale. Standard meters are for 1, 2, and 5 amperes. It is pointed out that care must be exercised not to subject the instruments to more than 200 per cent load.

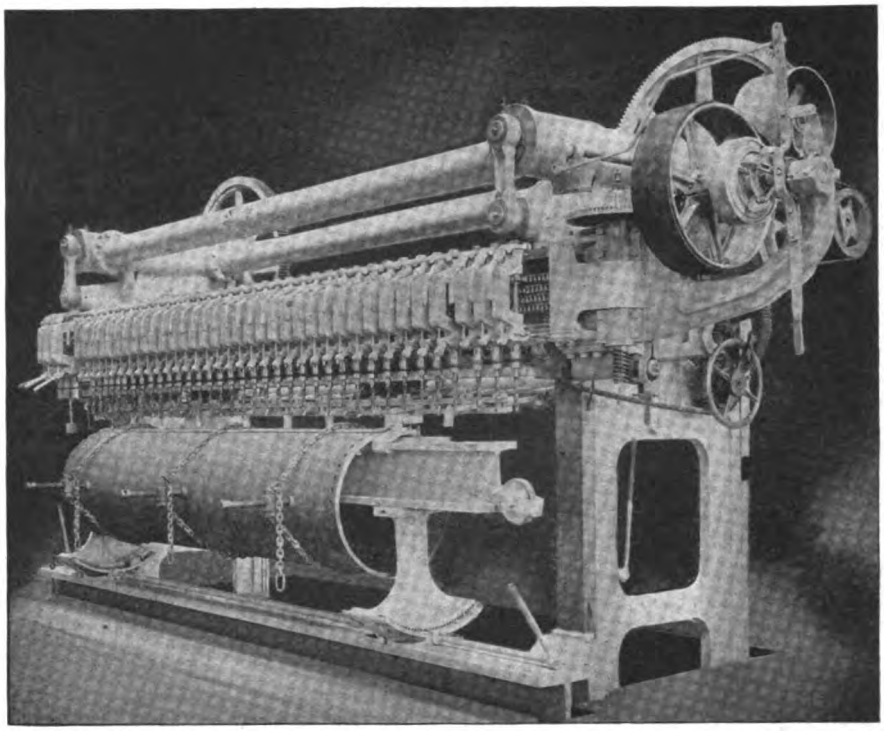
Portable Electric Drill

For accommodating taper shank drills up to ⅞-inch diameter, the Black & Decker Mfg. Co., Baltimore, recently developed the tool shown in the accompanying illustration. This drill weighs 27 pounds and is driven by a ½-horsepower motor. The drill is 17 inches long and 5¾ inches in diameter and has an offset spindle to accommodate the drill which is located 2⅜ inches from the center of the motor spindle.

This tool has an automatic controlling device. This drill has a capacity up to ⅞-inch holes in steel and is designed to handle a variety of work in the shipyard or machine shop where current is available.



ELECTRIC DRILL FOR SHIPYARD USE



MULTIPLE SPINDLE DRILL DESIGNED FOR SHIP AND BOILER PLATE WORK

Multiple Spindle Drill

To space holes in boiler and ship plates correctly and at the same time to make sure that the holes furnish a correct seating for the rivets is a problem that has confronted shipbuilders and boilermakers for many years. With the object of providing a rapid and accurate means for prosecuting this work, the Hilldrill Co., Philadelphia, recently designed the machine shown in the accompanying illustration.

This machine is designed to accommodate flat plates as well as those that have been previously rolled to a contour, boiler plates for an illustration. The construction of the machine is made as simple as possible and it is said that it can be operated without highly skilled labor.

These machines are built in various lengths the longest being 40 feet. This length of machine will drill 100 rivet holes at one operation, at one setting of the work. The machine consists of two end housings which are securely anchored to a concrete foundation. The housings are tied together by means of two heavy flanged pipe units. The object of using this design is to secure ample strength with a minimum amount of weight. At the front of the machine, the housings are fastened together by means of a substantial I-beam member.

On each housing is a slide which carries the table on which the work is located. The table is raised and lowered through the medium of four 3-inch elevating screws which are actuated by means of a worm drive. The crossrail on which are mounted the drill heads is made of I-beam section. It is finished from end to end between the flanges to form a bearing surface for the four endless chains that drive the drill spindles. This unit is also accurately finished to accommodate the drill spindle heads.

The chains that rotate the drills are driven by sprockets at the ends of the crossrail. At the righthand end, the sprockets are keyed to the shaft that forms the driving member while the sprockets at the other end of the machine are idlers.

The drills are fed downward by a mechanism operated by two large spur gears which operate simultaneously. This mechanism feeds the crossrail and drills down with a slow motion while the return movement is almost instantaneous. When the crossrail reaches its highest position a clutch is thrown out automatically which stops the machine.

The machine embodies several interesting features. The drills are fed down automatically and when the work is clamped in place a pressure of 20 tons is exerted which tends to straighten out any irregularities in the material to be drilled. It is said that the machine is particularly adapted for boiler plate work. In drilling the drums of boilers, the inner butt strap is placed in position, as shown in the accompanying illustration, where it is

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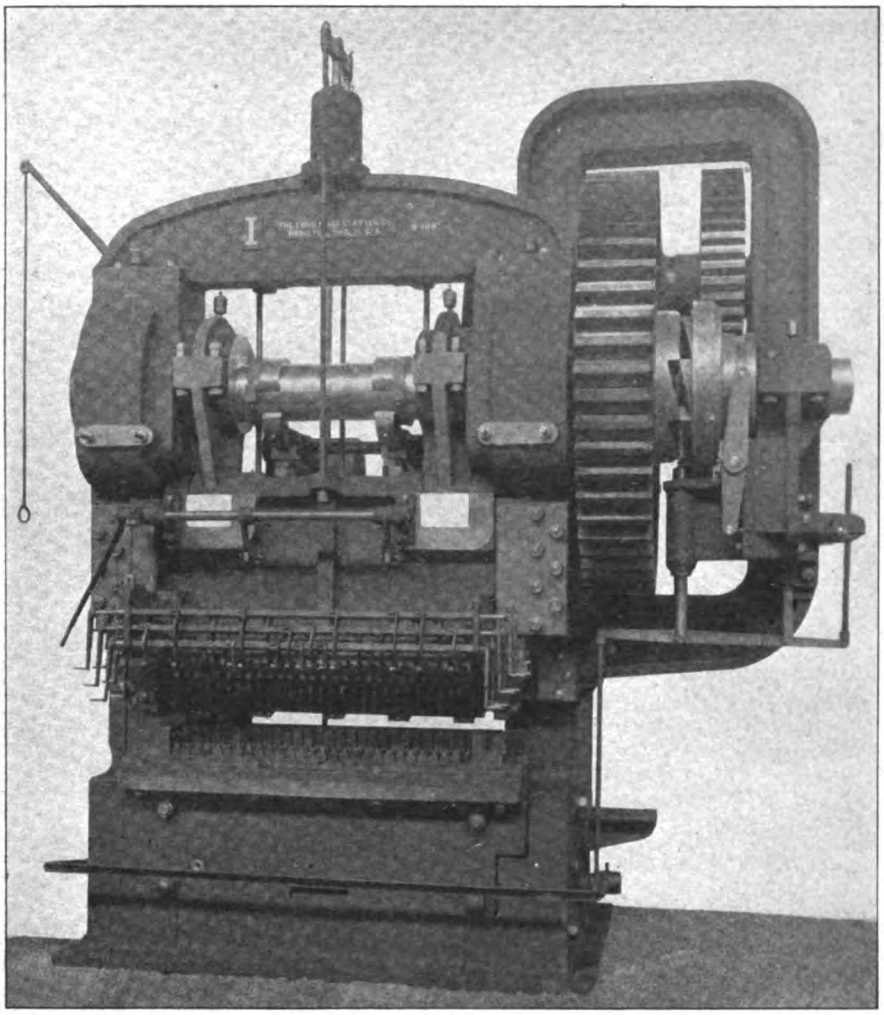

FIG. 1—PRESS DESIGNED TO PERFORM THREE OPERATIONS—PUNCHING, SHEARING AND TRIMMING

held by special gage bolts. The table or beam on which the work is located has an adjustment actuated by means of two geared sectors at each end to facilitate close setting.

The drills are lubricated by means of gravity. A small chain just back of the drill spindles travels over disks provided with pockets which fill with lubricant as they rotate in the trough provided for this purpose. As these disks revolve the lubricant is delivered to the central stem of the disks, which is hollow, and from there to a gutter machined in the drill spindle from whence it flows to the drills.

Punching, Trimming and Shearing Press

The press shown in the accompanying illustrations is a combination tool recently developed by the Long & Allstatter Co., Hamilton, O. It performs three functions that are sometimes carried out on three different machines, punching, shearing and trimming.

The press is of massive construction designed for hard service and is driven through the medium of spur, double-geared gearing with a ratio of 12 to 1. The main shaft actuates the punch slide by means of two eccentrics, each of which is placed as near the housing as possible to eliminate strain. The clutch is thrown in by means of a foot treadle and the sliding mechanism is balanced by air pressure. It is claimed that this method gives an efficient counterbalance.

The machine is equipped with individual punches and dies for punching operations while the cutting-off operation is functioned by a back upper and lower shear. There is a set of side trimming shears on each end of the tool holders. A safety device is provided to eliminate the possibility of spoiling plates through the punch and shear slides operating at the same time.

The plates are stripped from the punches through the medium of an automatic stripper having a direct vertical movement to prevent side action of the plate. The back shearing arrangement is used as a separate operation. Thus, when the main slide which controls the punching is in operation or when side trimming is in process the back shear arrangement is in an idle position. In use, when the punching operation is complete and the sides of the plate are trimmed, the punch gags are pulled out of operation and the rear shearing arrangment is brought into use. A clutch is next engaged with the master gear and the plate sheared to the desired length.

The machine will punch holes in groups or rows as desired. The number punched at one operation depends on the number and size of the holes and the thickness of the plate. The press is made in different widths between the housings, varying from 30 to 132 inches, while the throats are any depth from 12 to 36 inches. Fig. 1 is a front view of the machine from the operating side, while Fig. 2 is a cross section showing the interior mechanism.

Pipe Bending Machine

To bend pipe by hand is generally a long process in which the results are not always satisfactory. The finished bends may not be true to contour and, again, the finished product sometimes contains dents and sharp angles which not only impede the flow of fluids or steam when the unit is put to use but also present an unsatisfactory appearance. Imperfect bends also often fracture when the pipe is put in use.

With the object of simplifying pipe bending methods, the U. S. Shape & Pipe Bending Co., San Francisco, recently developed the machine shown in the accompanying illustration. This

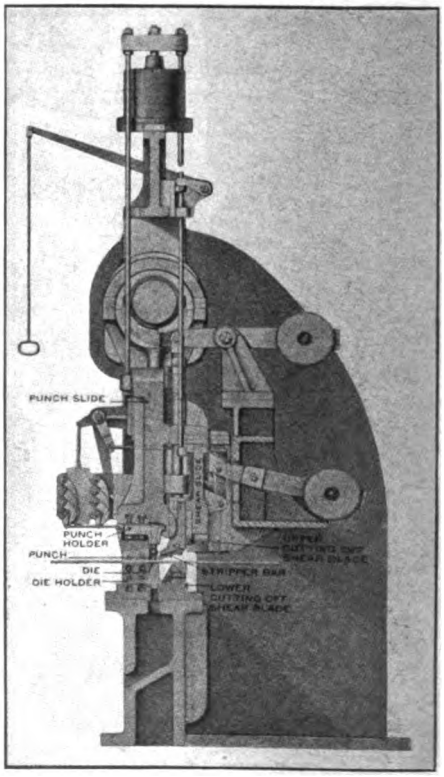

FIG. 2—CROSS SECTION SHOWING SOME OF THE OPERATING DETAILS

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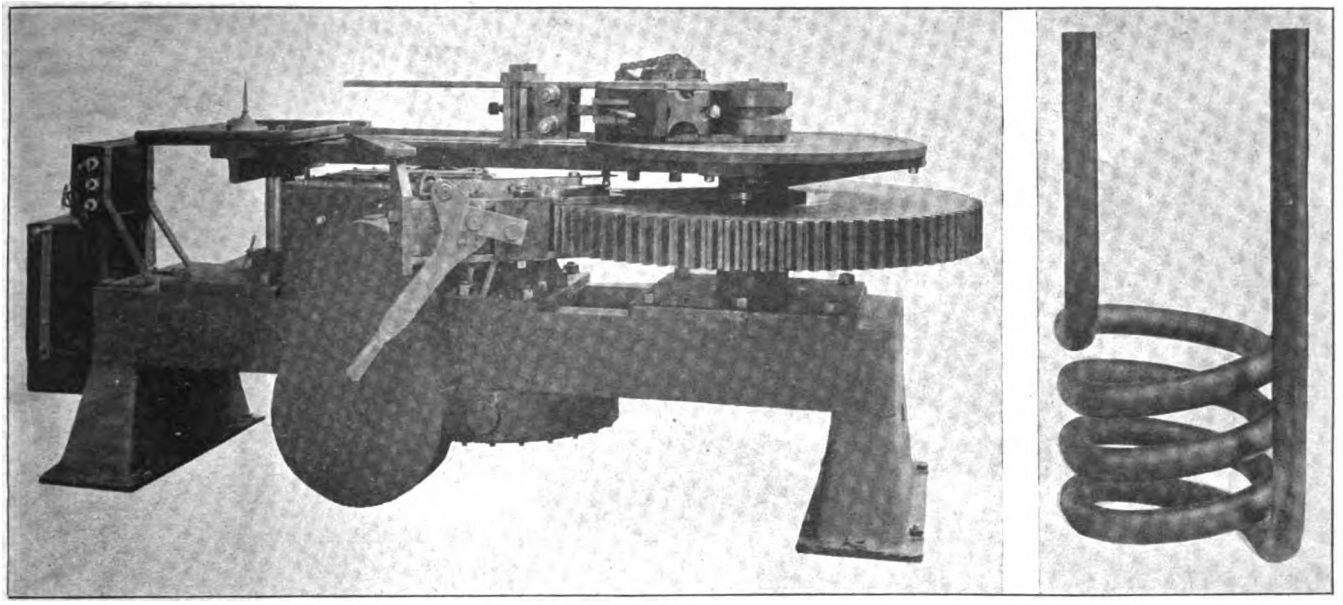

SELF-CONTAINED, PIPE BENDING UNIT DESIGNED FOR BENDING PIPE AND TUBING WHILE COLD

machine is designed to bend while cold all kinds of pipe and tubing up to 6-inch diameter. The machine is a self-contained, motor-driven unit and is semi-automatic in operation.

It is said that this machine will bend 3-inch extra-heavy pipe on a 12-inch radius at the rate of one 90-degree bend per half minute. The product, it is pointed out, is free from kinks or other mechanical injuries with its ability to withstand excessive pressure tests unimpaired. After the machine is set up for a given operation, any number of duplicate bends can be made.

The location of the weld with reference to the direction of bending does not present difficulties and it is pointed out that split pipes, generally caused by the weld failing in the bending operation, are rare occurrences. The machine handles round, oval, triangular and square coils. It is said to be particularly adapted for marine work.

Business News for the Marine Trade

The Canadian Pacific railroad is reported planning the construction of a new pier at Vancouver, B. C.

The Emergency Fleet corporation is reported contemplating building a dock at Erie, Pa.

A $20,000 shipbuilding plant is contemplated by the Hudson Shipbuilding Corp., Tarrytown, N. Y.

Plans are being drawn for the erection of a plant for the Winnisimmet Ship Yards, Inc., Chelsea, Mass.

The capital stock of the Premier Shipping Co., New York, recently was increased from $5000 to $100,000.

The American Construction Co., Cleveland, has opened offices at 704 Marion building, 1276 West Third street.

It is reported that the Richard T. Green Co., Chelsea, Mass., is having plans prepared for the erection of a drydock.

Fire recently damaged a 2-story tool shop at the plant of the Mystic River Shipbuilding Co., Somerville, Mass.

A $60,000 spar shop addition will be erected at the Portsmouth, N. H., navy yard by the bureau of yards and docks.

The Marietta Mfg. Co., Point Pleasant, W. Va., contemplates the erection of an addition to its marine ways for the construction of barges.

The Narragansett Shipbuilding Co., Portsmouth, N. H., recently started work on the erection of a drydock.

The Athens Shipbuilding Co., Athens, N. Y., recently increased its capital from $100,000 to $500,000.

Bids have been taken by the Boston Drydock & Shipbuilding Co., Boston, for the erection of a ship repair plant, estimated to cost $6,000,000.

The Baltimore Dry Dock & Ship Building Co., Baltimore, recently let a contract for the erection of a large warehouse.

Plans are being drawn for the erection of a small pipe bending shop for the Buffalo Drydock Co., Buffalo.

The Seattle Chain Co., Seattle, some time ago was awarded a contract by the government for anchor chains to equip 40 ships.

Fire recently damaged the machine shop of the Canada Steamship Lines, Ltd., Hamilton, Ont. The loss was estimated at $15,000.

Improvements to the plant of the Dominion Shipbuilding Co., Toronto, Ont., will be made, and will include the erection of a boiler house.

A waiting room and ferry slip is being planned by the Peoples Ferry Co., Bath, Me., of which E. R. Leonard is treasurer.

Plans are being prepared for the erection of a drydock costing $100,000 by the Tidewater Shipbuilders, Ltd., Three Rivers, Que. Pile work also contemplated by the company will cost about $40,000.

Bids have been taken by the Emergency Fleet corporation, Philadelphia, for the erection of a 2-story, 60 x 304-foot machine shop and office building at Field's Point near Providence, R. I.

A recent incorporation is that of the Chats Falls Navigation Co., Ottawa, Ont., which was incorporated to construct and operate vessels, with $50,000 capital, by Welden J. Graham, L. G. Roy and others.

According to a report the Newport News Shipbuilding & Drydock Co., Newport News, Va., will resume construction work on a $3,000,000 plant, construction of which was put in abeyance some time ago.

A shipbuilding plant, including a drydock with a capacity of 12,000 tons, machine shop and other facilities, will be erected by the Perth Amboy Drydock Co., Perth Amboy, N. J.

Incorporation papers have been granted the Robert Reford Co., Inc., Portland, Me., to build boats and vessels. The company is capitalized at $50,000 and was chartered by B. L. Merryman, R. N. Robinson and William S. Linnell.

The American Baltic Corp., Dover, Del., has been incorporated to build and operate vessels with $5,500,000 capital, by Charles D. Alee, L. B. Phillips, E. B. Thomas and others.

The Murray & Tregurtha Corp., Boston, recently was incorporated with $1,000,000 capital, by Samuel D. Messing, J. W. Troy and M. Sumner Coggan, to build boats, aircraft, motors, etc.

Announcement has been made by the Liberty Metal Products Co., Berea, O., manufacturer of marine metal specialties, that the company has increased its authorized capital to $35,000.

Adams, Lovell & Burlingham, shipbuilder, marine and mechanical engineers, has been incorporated with $101,000 capital, by T. D. Adams, R. L. Lovell and W. Burlingham, 90 West street, New York.

Erection of a new steel plate shop is reported being considered by the W. & A. Fletcher Co., Hoboken, N. J., which operates a shipbuilding and ship repair plant on Hudson street.

Plans for the establishment of a steel shipbuilding plant are being considered by the Wisconsin Shipbuilding & Navigation Co., Kewanee, Wis., according to a current report.

Plans have been prepared for the erection of a punch shop for the Buffalo Drydock Co., Buffalo. The building will be built at an estimated cost of $20,000.

The Gaspe Shipbuilding & Trading Co., Gaspe, Que., recently was incorporated to build ships, etc., with $75,000 capital, by Alfred Lacouvee, H. J. Hyman and Thomas H. Jopling.

Improvements and extensions to the shipyards at Three Rivers, Que., will be made by the Canadian Pacific railroad, Montreal, Que. The improvements

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will cost about $236,000. J. M. Woodman is general superintendent.

F. H. Simmonds, T. Folkedal and L. E. Brown, 32 Broadway, New York, are the incorporators of the Mildred Motorship Corp., which will engage in transportation and navigation with $200,000 capital.

With $100,000 capitalization, the Canadian-American Steamship Corp., New York, has been incorporated by H. Spielberg, H. R. Burney and J. Whelan, 69 Wall street.

The Wern Rotator Co., New York, recently was incorporated to manufacture riggings and hoisting machinery with $50,000 capital, by G. P. Wern and W. C. Wern, 96 Hamilton Place, New York, and H. C. Prout, 92 Oxford avenue, Richmond Hill.

A $7,500,000 ship repair plant will be erected at Norfolk, Va., by the Norfolk-Hampton Roads Ship Repair Corp. The plant will comprise two floating drydocks, two repair slips, machine shops and other facilities.

T. R. Taylor and E. D. Rasmussen, formerly of the Allis-Chalmers Mfg. Co., Milwaukee, are officers of the recently incorporated Hayton Pump & Blower Co., Appleton, Wis., which was organized with $50,000 capital.

The active working capital of the Todd Dry Dock & Construction Co., New York, is now $850,000 The company recently increased its capital stock to 70,000 shares of common and 5000 shares of preferred.

Plans were recently completed for a large floating drydock to be built at Green Bay, Wis. This structure will be of reinforced concrete and will be 80 feet wide and 630 feet long over working platforms, with a lifting capacity of 6000 tons. All machinery will be the latest design and will have direct-connected motors. The current will be obtained from a local power company. The plans were prepared by Morrison & Beck, Chicago, for the Carl Hartmann Co. Francis H. Early, naval architect, is associated with the engineers and is in direct charge of the work.

Wilfrid O. White, manufacturer and importer of navigation instruments, has moved his offices and salesrooms to 112 State street, Boston. Mr. White handles a complete line of sextants, compasses and other navigation instruments. Expansion of business due to maritime activities prompted Mr. White to change the location of his business.

Frank D. Chase, Inc., Chicago, has moved its offices from the Peoples Gas building to 645 North Michigan avenue, where it occupies the entire building. Expansion of the company's business necessitated securing larger office accommodations. The company is engaged in designing and equipping industrial plants, including shipyards.

Preliminary plans are reported being drawn by Norton Bird & Whitman, engineers, for the erection of a ship repair plant, which will include drydocks, shipways, machine shops, plate and angle shops, etc. The name of the owner is being withheld, but can be reached through Frank Furst, care of the Arundel Sand & Gravel Co., pier No. 2, Pratt street, Baltimore.

Charles Cory & Son, Inc., New York, have opened an office and salesroom at 585 Mission street, San Francisco. Also, they have established an agency with the W. S. DePierris Co., Seattle. The company manufactures and installs electrical and mechanical signalling apparatus and furnishes complete electrical marine equipment. Increasing demands brought about by shipping activities prompted the company to extend its facilities.

The American-Canadian Corp., organized under the laws of the state of Delaware, has acquired the entire ship production of the Groton Iron Works, the Noank shipyards and the Virginia Shipbuilding Corp. The total investment in the fleet of the company is placed at $76,000,000. According to the announcement made, a passenger service will be inaugurated to Europe. Freighters will be placed also in the South American and Far Eastern trade.

Judge John C. Knox, in the United States district court recently appointed Thomas M. Vinton temporary receiver of the Fougner Concrete Shipbuilding Co., under a bond of $25,000. This action was taken on a petition in involuntary bankruptcy. It was stated in the petition that the Fougner company which has an office at 50 Pine street, and a shipbuilding plant in Brooklyn, had admitted its inability to pay its debt but that it is now building ships under contract for the Standard Oil Co. and the Emergency Fleet corporation, and that large sums will soon be due it. No estimate of liabilities is given but the assets are put at $100,000.

New Trade Publications

CONCRETE EQUIPMENT.—The Ransome Concrete Machinery Co., Dunellen, N. J., has just issued a 50-page catalog devoted to the subject of concrete distribution by chutes. The catalog was prepared for the purpose of assisting the contractor and engineer to lay out a complete concrete plant. Standard methods employed by the company in connection with its equipment are shown together with many plans and views of complete plants.

CLAM SHELL BUCKETS.—The line of clam shell buckets manufactured by the Lakewood Engineering Co., Cleveland, is comprehensively illustrated and described in a 24-page bulletin. A number of interesting service views are included, as well as general data regarding sizes, capacity, details of construction, dimensions, etc. Two pages also are devoted to the extensive line of industrial haulage equipment built by this company.

HAULAGE SYSTEMS.—Flat wheel haulage systems developed by the Lakewood Engineering Co., Cleveland, are illustrated and described in a 24-page bulletin. This haulage equipment includes storage battery tractors for hauling trains of trailers, storage battery trucks for carrying deck loads not to be used with trailers, and trailers and hand trucks. The service views of these trailers are interesting and reflect the wide adaptability of haulage equipment. It may be used to advantage in practically all industrial operations.

MARINE MACHINERY.—A 56-page catalog devoted to marine equipment has just been issued by the Lidgerwood Mfg. Co., New York. Among the appliances described are ship cargo winches, steering engines, dock winches, marine transfer equipment and towing machines. Apparatus for coaling at sea and life saving cableways are also described. The catalog is complete in every respect. The numerous articles are illustrated and described fully. Many of the illustrations are taken from actual installations aboard ship. Steering engine data included is especially interesting. All the factors governing the selection of this equipment are listed for the convenience of the naval architect and complete diagrams

DRAWING TABLES.—The Economy Drawing Table & Mfg. Co., Adrian, Mich., has issued a booklet describing its drawing tables, filing cases, etc., for engineers, architects, contractors, manufacturers and others who employ the services of draftsmen. Several types of tables are illustrated and described. It is pointed out that the conveniences of a drawing table will enable the workman to turn out more work per day and that proper provision is made for accommodating the numerous tools used in the average drafting room. The latter part of the booklet is devoted to general specifications and construction details.

PLANERS.—A booklet devoted to metal planers of the open-side type has been issued by the Cleveland Planer Co., Cleveland. Various features of the machines are explained and several illustrations are included, many of which show practical operations. These machines are made with both parallel and right-angle drive. It is pointed out that the machines are designed to take the heaviest cuts the tools will stand and that the open-side construction permits handling awkward jobs with a minimum of delay.

STEAM HAMMERS.—The Erie Foundry Co., Erie, Pa., has issued a 44-page catalog devoted to steam hammers, drop hammers, trimming presses, sheet galvanizing machinery and shearing machinery. The catalog is well illustrated and complete descriptions of the various tools are given. Part of the catalog is devoted to steam hammer foundations. It is pointed out that a foundation for a steam hammer should be resilient with sufficient flexibility to absorb the vibration resulting from the impact of the dies when the hammer is in operation. Four line drawings accompany this description and show how the oak timbers that support the anvil are fastened to the concrete foundation. The catalog also contains instructions for erecting the hammers, operating and method of resetting the valves as occasion requires. The catalog also includes complete sectional drawings of the company's several types of hammers.

ELECTRIC DRILLS.—A circular describing electric drills has recently been issued by the Independent Pneumatic Tool Co., Chicago. These drills are adapted for a variety of purposes such as drilling and reaming holes in general steel work wherever current is available. It is pointed out that it is impossible to stall the drill when working within its capacity. Several illustrations are included showing various types of drills for different purposes.

SHIP CASTINGS.—A catalog devoted to gray iron ship castings has just been issued by the Central Foundry Co., New York. Mooring fixtures and general castings are described and illustrated. These include air extractors, bitts, bollards, chocks, cleats, davit steps, fairleaders, mooring ports, mooring rings, chain pipes, hawse pipes, bilge and ballast flanged pipes, pipe flanges, hawser reels, coal scuttles, deck scuttles, sheaves and housings for limberchains and windlasses. It is pointed out that the constant changes being made in design necessitate many and varied ship castings due to lack of standardization.

MARINE OIL ENGINES.—The H. W. Sumner Co., Seattle, recently issued a booklet giving specifications of its marine heavy oil engines. Two illustrations are included. One shows the company's 350 shaft horsepower engine and the other a typical auxiliary vessel. The specifications are complete in every respect and cover the subject thoroughly. Some interesting figures are included taken from the log of the auxiliary schooner SANTINO on two different voyages. These figures give the time consumed, distance traveled, average speed, total cargo, fuel oil used, average consumption per 24 hours, lubricating oil consumed, draft leaving and draft arriving. The information is of interest to marine engineers, shipbuilders and ship owners.

SUPERHEATERS.—A catalog devoted to marine superheaters of the waste-heat type has just been issued by the Power Specialty Co., New York. Much information of value to the marine engineer and naval architect is given and several illustrations are included. The superheater is placed in the uptake above the smoke box and its function is to absorb heat from the gases on their way to the stack. The superheater consists of two open-hearth steel headers placed horizontally across the front of the uptake and connected to each other by a series of superheater elements. The upper header receives the steam from the boiler and distributes it to the superheater elements while the lower header collects the heated steam and delivers it to the main pipe.

The Sun Co., Philadelphia, has issued two interesting illustrated booklets devoted to its products. They are part of a series issued monthly by the company. One is devoted to fuel oil and the other to petroleum. Many interesting facts are given which are of value to the consumer. It is pointed out that there are certain incidental economies peculiar to the use of oil which must be considered in making installations. Much information of a historical and technical nature is given on petroleum.

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